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PROFITABLE CLAY FARMING UNDER A JUST SYSTEM OF TENANT RIGHT

JOHN PROUT

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BY

JOHN PROUT.

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PROFITABLE CLAY FARMING.

INTRODUCTION.

When it is stated that I farm 450 acres of heavy land, all under the plough, and almost entirely devoted to corn, some persons may consider me an object for commiseration or a victim to bad seasons, foreign competition, and other elements of the agricultural distress. On the contrary, however, I affirm that my farming pays. I am satisfied with my cultivation of clay, and I do not wish that it were grass. The bulk of the cropping is grain, and I have no intention of replacing any portion of it by forage or root crops for live stock, or by vegetables for the market. I grow and sell both the corn and straw of my wheat, barley, and oats, and also sell off all the artificial grasses made into hay; and, after nineteen years' experience, I see no reason for abandoning my practice. While a large proportion of the farmers of England despair of recovering capital which they have sunk during the last four years, my case is by no means one for despondency. I am not afraid of overwhelming imports of wheat and flour from countries where land is cheap and skies are sunny; of immense arrivals of live animals, dead meat, cheese, vegetables, fruit, or wool; and I am confident that, in the present and prospective low state of the markets, my system can still earn an adequate return for tenant's capital, and at the same time afford a satisfactory rent to the owner.

The deduction is, that the same husbandry on similar soil would yield a like profit to other occupiers. The object of this publication is to show by example, how hundreds of farms in perhaps a majority of the English counties may be tilled as successfully as mine.

SAWBRIDGEWORTH, HERTS, *May* 1881.

INDISPENSABLE REQUISITES TO CLAY FARMING.

The system may be described in brief as perpetual corn-growing on heavy land by means of deep and cheap steam-tillage, and plentiful applications of artificial manure.

The indispensable preparatory requisites are (1) effectual subsoil drainage, and (2) fields of considerable dimensions; to which may be added (3) straight and neat fences, (4) sound headland roads, and (5) convenient field water-supply.

It will be observed that a common costly item in permanent improvements, the erection of farm buildings, is not included among the necessary preliminaries. The crops grown by my method may be disposed of in alternative ways. If straw and hay are sold off, as practised by myself, no premises are required beyond barns, granaries, working-horse stables, implement sheds, and stores for artificial manure. But in some situations it may be preferable to consume those products on the farm, converting the straw into manure in yards and feeding-houses, and in such cases the farm must be equipped with sufficient premises and the requisite appliances for the preparation of cattle food. With this modification of the system, the farmyard manure resulting from the use of the straw would probably be applied to a portion of the farm on which green and root crops were taken perpetually, while the major portion would yield cereals in endless succession, dressed with artificial fertilisers.

Good drainage, I have said, is indispensable, because without it deep culture and subsoiling are of no avail, the soil cannot be sufficiently aërated and fed with gaseous nutriment from the atmosphere, an adequate development of the roots of crops is prevented, and a suitable temperature is rendered impossible by prolonged wet and evaporation. Large inclosures are requisite, because without them the full economical advantage in working steam-tackle cannot be obtained, the farm is more expensive to keep clean, the drying of the surface of the land and of crops is retarded by the excessive shading of numerous fences, while the produce is exposed to heavy damage by the depredations of infesting birds and vermin. Straight and compact fences, firm headland roads, and field-ponds or wells are desirable, not only for cheapening the transport of produce and facilitating the supply of coal and water to the steam tilling-engines, but also for saving time in the performance of the heavy field work, and enabling the engines to travel in wet seasons when, in the absence of such permanent ways, the operation would be difficult, or their weight would injure the land.

Where sound drainage and large fields are already provided, steam tillage and artificial manuring for continuous corn crops can be commenced without further preparation. But as, unfortunately, all but a fractional part of the strong land of this country lies in small irregular inclosures, often choked with banks, bushy hedges, and timber, and imperfectly drained, if at all, the adoption of my husbandry in such a manner as to yield profit involves the carrying out of the preparatory improvements enumerated. And hence I must first of all show that such works of permanent, or more or less durable improvement, whether profitable or not in other cases of land reclamation, are certainly remunerative when executed upon clay land for the purpose of introducing the system.

PERMANENT IMPROVEMENTS.

In the autumn of 1861 I entered upon "Blount's Farm" and "Sweet Dew's Farm" (which are now thrown into one), situated near Sawbridgeworth, in Hertfordshire, about four miles from Bishop's Stortford, and a similar distance from Harlow. I began at once with permanent improvements; not, however, in building, for the two sets of farm premises with little addition were ample for my purpose; being, indeed, sufficiently adapted for cattle breeding and feeding on a moderate scale, as well as for my projected corn-farming. The old barns, stables, and out-buildings, the dwelling-houses and two cottages, were overhauled and repaired; and at a subsequent period a granary and a third good cottage were erected. The outlay was about 750*l.*

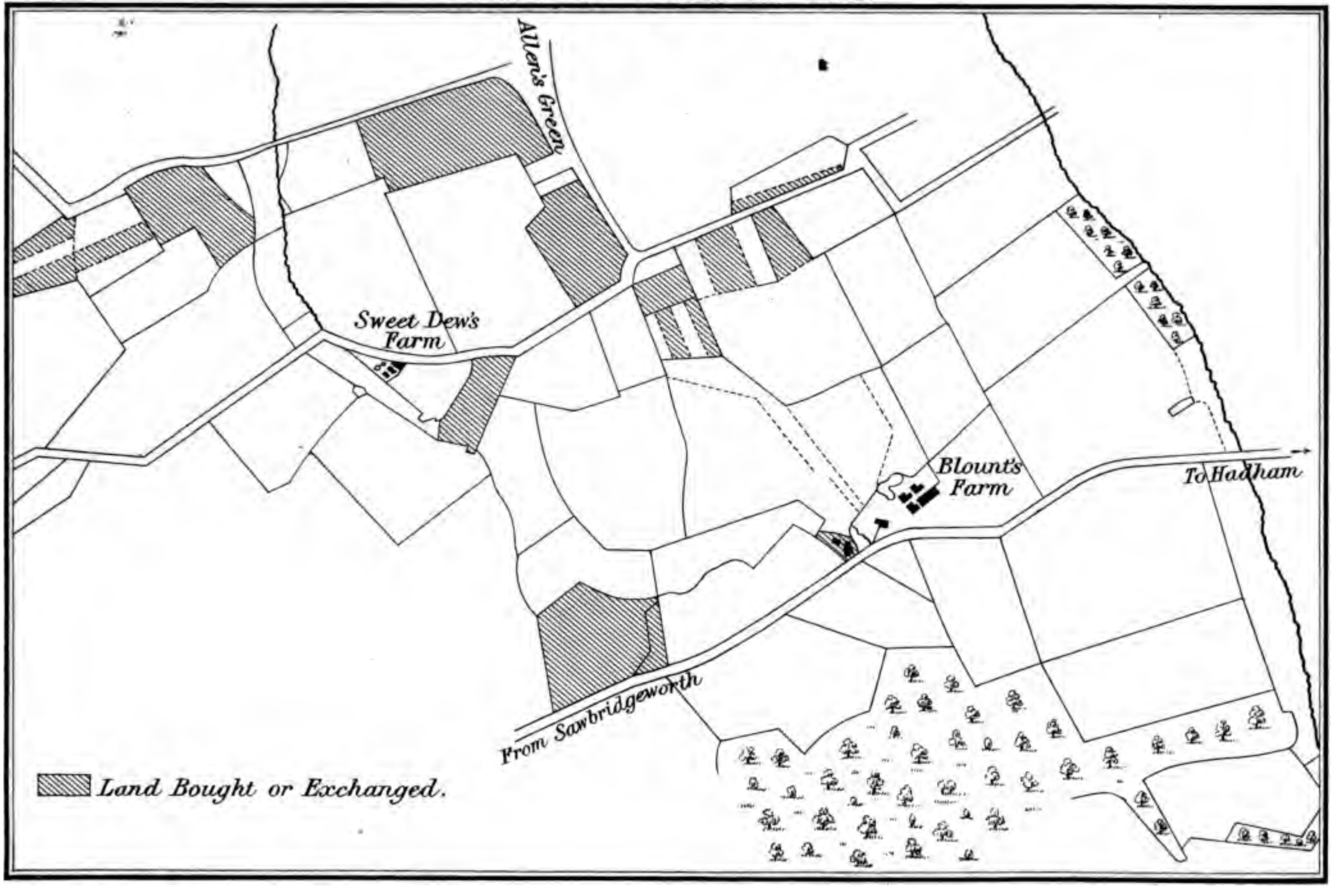
The land, consisting of clay and strong loam lying upon a subsoil of drift-clay and cretaceous gravel, was in a wet condition, having been drained only in parts by shallow bush or thorn drains, which, in stiff soils, are of little use. Here, therefore, as will be the case upon millions of acres still lying unimproved, the first and fundamental process of amelioration was to drain the whole effectually with pipe tiles.

The land lay tolerably well for draining, and the first thing was to ascertain, by test holes dug in the different fields, what would be the best depth at which to lay the tiles. Subsoils vary greatly in their nature, sometimes in the same field, and judgment had to determine where variations from the general average depth should be made in order to produce the best effect at the least cost; and the proper distances of the drains apart were found from this depth and the character of the subsoil in which they had to be laid. The average depth chosen was 3½ feet, the distance apart 33 feet; the 2-inch pipes of these parallel drains empty into 4-inch and 6-inch mains, discharging in most cases into an open drain or ditch of 5 or 6 feet in depth, these mains intersecting or dividing the fields, and conducting the surplus water into a stream which is a tributary of the River Lea. The work was completed in four years, at a cost of 6*l.* per acre, amounting to an outlay of 2700*l.* The rainfall at Sawbridgeworth, I believe, averages about 23 or 24 inches per annum, which is moderate in quantity compared with the fall in the west of England; but I cannot assign too much importance to the work of draining well. Indeed, the transformation effected in the very texture of the soil, as well as in its temperature, and in the climate of the farm (to which I shall refer), are results following from this efficient drainage and from the steam tillage which was rendered possible by the drying of the land.

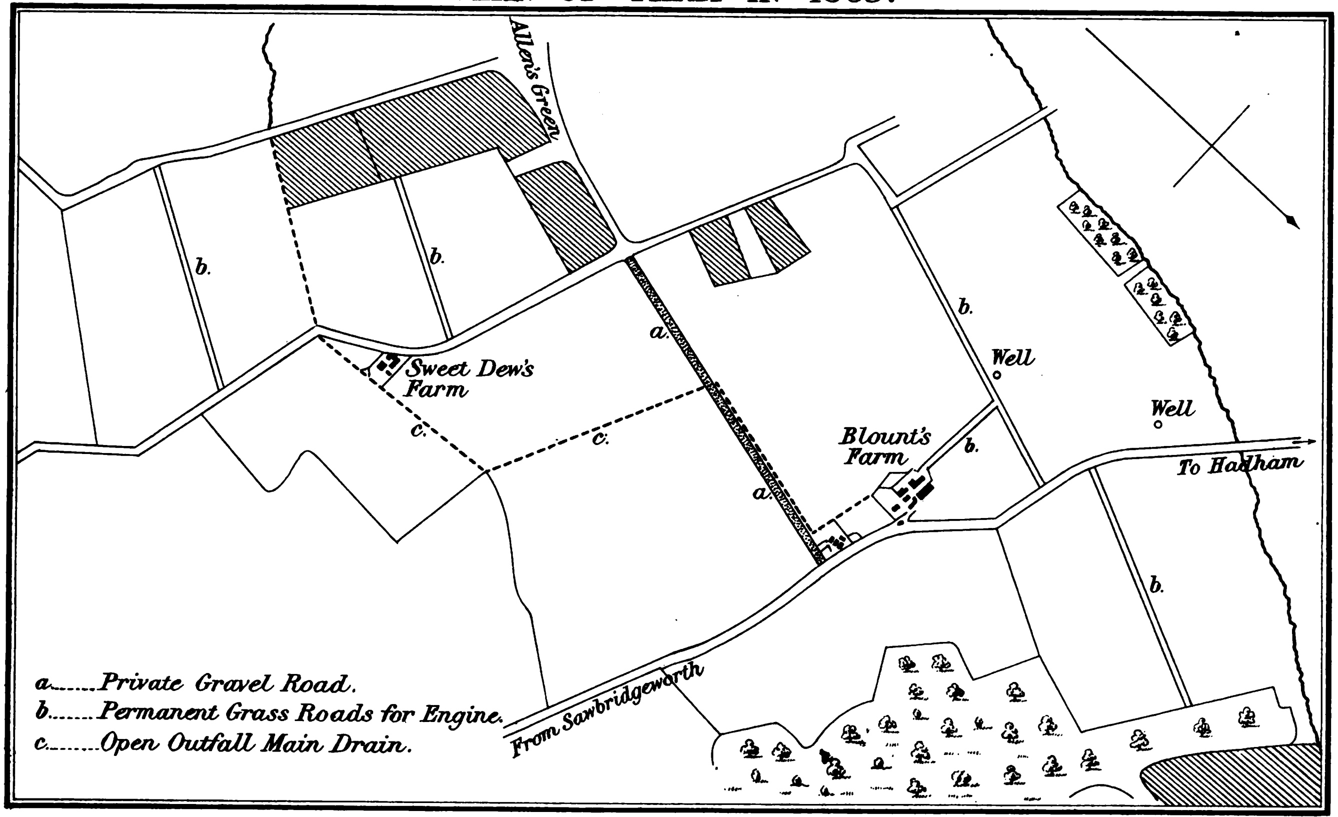
For rapid and effectual discharge of the drain-water, I cut nearly one and a half mile of straight, deep, open outfall main drains, in lieu of wandering and weedy ditches which were filled up. The cost of these outfall improvements was 156*l.*; but a portion of this was quickly recouped, seeing that, by filling in the useless ditches, and by levelling in a few moats, ponds, and waste places, an area of two and a half acres was added to the estate.

The two farms, enclosed within one ring fence, I found subdivided into fifty-one enclosures, averaging under nine acres each. Straggling internal fences, encumbered with brushwood, pollard trees, and other inferior timber, wasted a great proportion of ground, hindered the proper expedition of tillage operations, harboured weeds, birds, insects, and vermin, injuriously shaded both land and crops, and would have been of great expense to reduce into neat form and to keep trimmed and in repair. In four years I grubbed up nearly six and a half miles of ancient hedgerow, removed crooked banks, and filled in the ditches alongside; throwing the whole area of the two farms into nine principal fields of nearly fifty acres each, arranged generally in quadrilateral figure. By exchanges of plots and corners with adjacent proprietors (paying somewhat fancy prices for the accommodation, except in the case of Lord Ebury and one or two other neighbours), the outside boundaries also were made rectilinear.

PLAN OF FARM IN 1861.



PLAN OF FARM IN 1865.


Allen's Green
b.
b.
a.
Sweet Dew's Farm
c.
c.
b.
Well
Well
Blount's Farm
b.
a.
To Hadham
b.
From Sawbridgeworth
a.......Private Gravel Road.
b.......Permanent Grass Roads for Engine.
c.......Open Outfall Main Drain.

Stanford's Geogl. Estabt.

The outlay in grubbing, &c., was 155*l.*, but part of this was recouped. The hedge-roots were given to the labourers, and the brushwood was either buried in drains or used for burning; but nine hundred and twenty trees, consisting of pollards and other trees of little value, came in for gates, gate-posts, and other workable stuff valued at 42*l.* The nett cost of the clearance was thus 113*l.* The gain to the estate was five-fold. As the abolished fences and banks had averaged no less than seven yards in breadth (measuring between the outside furrows made by the plough in contiguous fields), an area equal to sixteen acres of cultivable land was added to the farm; and, at the then price of the property, this was worth 35*l.* an acre, making a total acquisition of 560*l.* This, of course, appears in the greater value of the farm to the owner for ever. The perpetual yearly gain to the occupier can hardly be valued, but it must be very considerable. It is realised in tillage operations rendered cheaper (from the diminished number of turnings at the end of short furrows, and from the absence of innumerable awkward corners), in the saving of expense in cleansing the land (from the abolition of slovenly borders which spread root-weeds and act as nurseries for seedlings), in the forwarding of tillage processes, and especially at seed-time (from the more rapid drying of the surface), in the advantage in hay-time and harvest (from the quicker drying of the crops after rain), in the increase in produce (from the extirpation of sucking tree-roots and the removal of overshadowing trees which intercepted the rays of the sun around a network of small fields), and in the saving of produce (from the destruction of birds and vermin). It is certainly a fact that what may be called the climate of the farm has been improved both for seeding and harvesting.

Taking the clearing and outfall works together, the outlay in the course of four years was 311*l.*; the return, eighteen and a half acres of land and 42*l.* worth of wood, or a total acquisition of 690*l.* To put it in another way, the owner gained eighteen and a half acres of land at a cost of 14*l.* 10*s.* per acre, while the rental value of the whole farm was largely increased for ever.

For facility of transporting produce and manure, coal and water, and for keeping the heavy steam-ploughing engines off the cultivated land, two miles length of grass roads, of ten feet breadth, were made along the straight headlands,—these grass roads being formed by simply ploughing and rolling, and then partially coating the top with small stones picked off the fields. And through and across the middle of the farm were laid out hard gravel roads, nearly a mile in length, communicating with the grass roads and with the two homesteads. These hard ways were expensive; but the green headland paths or roads, from which the engines can cultivate every portion of every field without travelling on the land, did not incur a serious outlay, considering that some extra labour of men and horses did the whole, and that for the new straight road laid down a greater extent of old crooked road was ploughed up and added to the arable surface.

At points along the roads convenient for supplying the engine water-cart, small brick reservoirs were made, or wells sunk and pumps fixed, one brick reservoir being of capacity for holding 15,000 gallons of water. But the well-sinking was not a matter of very heavy expenditure, seeing that water from the subsoil drains or from springs is accessible at very moderate depth.

The total outlay upon buildings, drainage, outfalls, wells, reservoirs, roads, straightening of boundary fences, clearing of hedges and trees, levelling, reclaiming, and remodelling the plan of the farm to adapt it for steam cultivation, amounted to about 4500*l.*, or 10*l.* per acre. And this expenditure was incurred in the first four years after my entry in 1861.

PROFITABLENESS OF THE ESTATE IMPROVEMENTS.

The Permanent or so-called Landlord's Improvements have proved an admirable investment.

In 1861 the two farms, now in one property of 450 acres, had been for some time in the market, not being readily saleable owing to their wet and foul condition, and were purchased for the sum of 15,000*l.* The exchanging and buying of corners to straighten the boundaries, together with the legal expenses, came to about 1000*l.*, making the total purchase-money 16,000*l.*, or 35*l.* per acre. The rent at that time stood at twenty-five shillings per acre, or 3½ per cent. on the principal; the farm having thus been bought at a little under twenty-eight years' aggregate rental. Would it have paid the owner for laying out the 4500*l.* on permanent works and the rectification and adaptation of the estate for the proposed system of management, if the occupier had paid 5 per cent. interest upon the 10*l.* per acre; in other words, if there had been added to the former rent 10*s.* per acre, making the improved rent 35*s.* per acre? Did the farm under the husbandry pursued augment in value sufficiently to yield such an increase in rent? Well, in the year 1875 the late

Mr. Thomas C. Scott, the experienced land agent and surveyor, made a valuation of the property, fixing the nett rent to the landlord not at 35*s.* but at 45*s.* per acre, and the value of the fee-simple at 31,000*l.* I shall refer in due course to the report in which Mr. Scott set forth the considerations forming the basis of his valuation, and I shall also show that his judgment is borne out by the increased productiveness of the land. But, assuming the estimate to be approximately near to the true value, it appears that the 16,000*l.* purchase-money and the 4500*l.* in improvements, making 20,500*l.* together, grew to 31,000*l.* in ten years after the outlay. The price in 1861 was 35*l.* per acre; 10*l.* an acre expended upon the farm up to 1865 brought the total cost to 45*l.* per acre, and, without any further landlord's improvements, the value in 1875 had risen to 69*l.* per acre. This increase is far more than any reasonable proprietor could expect to realise from his investment of 45*l.* per acre in the land and its permanent improvement; and I shall, in the course of my statement, give my reasons for assigning a considerable portion of this augmented value to the occupier. Of course it will be seen that a general fall in the value of land would not reduce the proportion in which additional value is obtainable by improvement works like mine. At lower figures the farm would have risen from, say, 25*l.* up to at least 50*l.* per acre, instead of from 35*l.* up to

69*l.* per acre. Nay, it appears that by reckoning the values at 10*l.* per acre reduction both before and after the improvement, the farm would have risen from 25*l.* up to 59*l.* per acre, which is a greater percentage of increase due to the work of amelioration.

No doubt the effect of the lamentable agricultural depression has been to lower the value of the estate since 1875. But improvers who now begin to follow the example will have this cheapness of land in their favour; and this I shall remark upon when considering the prospects of the system under a continuance of low prices for land and for produce.

HISTORY OF THE TILLAGE.

I come now to the Occupier's Investment and Return; and to show how my husbandry is profitable, and that it will pay, indeed, even when corn ranges at low prices. To do this I must briefly describe what I have done, spent, and realised.

At the time of entry, in 1861, the farm was poor and wet from being undrained, or but partially and very imperfectly drained. It was foul with couch grass, docks, thistles, and other weeds, and altogether in a very bad state, and in a low condition of fertility. It took at least four years to bring the land into cleanly tilth, and to effect that deepening of the staple which was necessary for the success of the proposed system of culture. In the two years 1862 and 1863 I ploughed 1401 acres, deep-cultivated 480, and subsoiled 277 acres 14 to 16 inches deep; and this heavy working of 2158 acres on the 450-acre farm was really equivalent to working the whole of the land five times over in those two years. In fact, only a small proportion of the farm was sown with grain, ploughed for but once. As much as 320 acres were bare-fallowed in the two years, a great deal of the ground having been so wet and foul that it was not cropped until it had been fallowed for two years in succession. In the year 1864 I fallowed

130 acres, in 1865 131 acres; but the costly cleansing soon after ceased, and for the last ten years I have grown crops on the entire surface of the farm.

As might be expected, the bill for manual labour was excessively heavy during the first four years. Horse work, great as it was, would have involved a ruinous outlay, had not the heavier tillage been performed by steam-power; but horse teams really could not have executed the work at all. Certainly no force of horses that I could have employed would have accomplished the deep and difficult operations in the same time, so as not to miss seasons, and without injury to the soil from trampling.

Comparison of the early with the present rate of expenditure shows that the fallowing, cleaning, deep-tilling, and subsoiling during the first four years cost 1500*l.* more than ordinary tillage would have done had the land been in good order at starting. In addition I spent 1200*l.* in ameliorations in subsequent years, making 2700*l.* of tenant's capital invested, beside that which is engaged year by year in the now regular course of business. This 2700*l.*, which I had to recoup, besides earning a profit on the normal tenant's capital, will be referred to in an abstract of expenditure and return. It constitutes a part of the tenant's investment, which, as I have said, entitles him in equity to a share of the enhanced value accruing thereby to the fee-simple of the estate.

It is well to point out that great encouragement for improvers is derivable from the progressive diminution of the tillage expenses. This appears in the following tabular statement of the number of acres worked by the steam tackle in each year:

Steam Tillage for Seventeen Years.

Year.	Acres Subsoiled.	Acres Ploughed.	Acres Cultivated.	Total Number of Acres Steam Tilled.
1862 and 1863	277	1401	480	2158
1864	191	409	264	864
1865	98	496	317	911
1866	..	310	..	310
1867	..	637	174	811
1868	..	321	257	578
1869	..	386	116	502
1870	..	281	277	558
1871	..	296	130	426
1872	57	304	55	416
1873	..	363	4	367
1874	..	408	..	408
1875	..	343	..	343
1876	..	310	..	310
1877	..	215	66	281
1878	..	272	..	272
		Total ..	.. ..	.. 9515
Average of last 13 years	.. ..	.. .. ..	.. ..	.. 429
„ „ 9 „ 1866–74		.. .. ..	.. ..	.. 486
„ „ 4 „ 1875–78		.. .. ..	.. ..	.. 301

The total steam work done in the first four years —1862–65—averaged 983 acres per annum; in the four years 1871–74 it averaged only 404 acres, or much less than one-half. This is a feature in heavy land steam culture which is well worthy of remark. Now, this economical result has been mainly due to the greater friability of the soil, gradually acquired from thorough drainage and the influence of deep as well as mechanically efficient culture by steam power. It will be observed how the proportion of cultivating or scarifying has decreased, the turnover work of the plough being now more largely preferred to the breaking and stirring of the cultivator tine, because the land, having been got into a thoroughly clean state, no longer requires cleansing and fallowing operations, and because there is no preparation of seed beds for roots requiring the action of the cultivator. Under the system of sowing consecutive crops of cereals, I find that ploughing is preferable to cultivating.

It will be seen that 623 acres of subsoiling have been done, so that 173 acres have been subjected twice over to this drainage-aiding and deep-aërating process. This has had great influence in improving the mechanical texture of the soil.

The manual labour bill has been as follows, omitting the exceptional years 1879 and 1880, in which the crops were principally harvested by my men without being sold off.

Manual Labour Bill for Seventeen Years.

Year.	Amount. £	s.	d.
1862	836	4	2
1863	1142	14	4
1864	1020	0	4
1865	871	19	5
1866	437	11	1
1867	616	6	0
1868	509	14	6
1869	551	14	6

Year	Amount		
	£	s.	d.
1870	534	5	6
1871	478	8	6
1872	656	8	10
1873	553	9	6
1874	467	14	6
1875	434	19	7
1876	474	2	10
1877	458	6	5
1878	452	16	6
Average of 13 years, 1866–78 ..	509	0	0
„ of 9 years, 1866–74 ..	534	0	0
„ of last 4 years, 1875–78	455	0	0

The average cost of manual labour during the first four years, namely, 1862–65, was 967*l.* per annum; but more than half of this was outlay upon the drainage and other permanent improvements, and will consequently be found omitted from the statement of average working expenses, though included in the sum charged as improvements. For the period of thirteen years, 1866–78, the manual labour bill has averaged 509*l.* a year, or 22*s.* 7*d.* per acre over the whole farm. This lightness of the account (amounting to only about half what the artificial manure bill comes to) arises from the fact that I have grown scarcely any roots, have kept but little live stock at any time besides the working-horses and one cow for milk, and have only in a few instances harvested and thrashed portions of the corn crops, these, which cover most part of the land, having been almost entirely sold off as they stood.

The reduction in the labour bill during the later years is a very encouraging feature. For, while it averaged 534*l.* a year during the nine years 1866–74, it decreased to an average of only 455*l.* a year during the last four years of 1875–78.

As to farm-horses, I keep six to eight, upon 450 acres of strong arable land; and after May these few teams have scarcely anything to do, beyond getting in the hay, until harvest arrives, when they are hired out to customers who buy the corn crops. But for a season I supplement this force with a few extra ones bought in autumn if an extra breadth of wheat has to be sown in October, or purchased in spring if a larger extent of barley has to be put in. These extra horses are well kept for a month or two, and sold out again for about as much as they cost.

If I grew more roots, and if I harvested and marketed the corn crops, made the straw into manure, and applied it to the land, the labour account would be heavier. But, on the other hand, the bill for artificial manures would be lessened.

Rotation of cropping, the basis of ordinary arable husbandry, is unknown upon my farm. Upon looking at the tabular synopsis of cropping, it will be found that of late years about six-sevenths of the whole area have been always under corn, while the acreage of roots has been next to nothing. The number of acres under each kind of crop, or fallowed, in each year, has been as follows:—

Yearly Acreage of Cropping for Nineteen Years.

Year.	Bare Fallow.	Roots.	Wheat.	Barley.	Oats.	Beans.	Total Corn.	Rye-grass and Clover, Hay and Tares.
	acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.
1862	140	60	..	5	140	32	177	67
1863	182	25	137	30	52	..	219	18
1864	130	30	147	73	29	..	249	14
1865	131	20	72	65	50	54	241	52
1866	..	4	223	124	60	..	407	33
1867	105	8	67	93	15	50	225	88
1868	14	4	170	60	66	72	368	58
1869	55	1	126	30	70	64	290	58
1870	..	2	208	57	..	102	367	66
1871	..	4	149	93	36	53	331	107
1872	..	7	340	..	22	..	362	68
1873	..	3	309	..	62	..	371	58
1874	..	5	310	..	60	..	370	55
1875	..	4	202	133	40	..	375	52
1876	..	12	193	129	52	..	374	48
1877	..	3	168	151	81	..	400	36
1878	..	3	113	220	34	..	367	79
1879	..	3	120	210	40	..	370	63
1880	..	4	158	132	86	..	376	56

For the first four years the bare fallow averaged 145 acres, the root crop 34 acres, and corn only 221 acres, no wheat at all being taken the first year. For the five years ending 1874 the bare fallow was *nil*, the breadth of roots reduced to a plot of a few acres, the average extent of corn 360 acres, and the average crop of hay made from artificial grasses 71 acres; while latterly the cropping has been about six-sevenths of the farm with corn, and the remaining seventh hay, all sold off.

During the first nine years I did not sow any red clover, the land being clover sick; and the acreages from 1862 to 1870 inclusive refer to ryegrass, tares, and a little meadow hay.

Since then about 50 acres of clover have been grown annually; in other words, 348 acres of clover have realised 4520*l.*, equal to 12*l.* 19*s.* 9*d.* per acre during the seven years 1872–1878. The first cut was made into hay, and the second sold standing to be secured by the purchaser.

Clover.

Year.	No. of Acres.	Sum realised per Acre.
		£ *s.* *d.*
1872	55	12 3 6
1873	48	9 18 4
1874	45	10 8 0
1875	51	16 1 11
1876	48	18 0 0
1877	36	12 6 4
1878	65	14 5 0

The proportion of wheat grown in the years 1872–74, was increased simply because I found that, whatever might be the yield or the market price of barley or of oats, the wheat crops gave me from 2*l.* to 3*l.* per acre more money. Since then, and until last year (1880), I grew more barley; and in 1878 and 1879 the breadth of barley approached to double that of wheat. Having no order of rotation of crops, a major portion of the wheat follows wheat; some is sown after barley, some after oats, and a part after clover.

As an illustration of the series of crops, I give the following list of crops which have been taken upon six fields.

Cropping taken off Six Fields in Nineteen Years.

Year.	Home Field, 60 Acres.	Cross Field, 56 Acres.	Dudley Field, 40 Acres.	Black Acre, 34 Acres.	Park Spring, 26 Acres.	Beadles, 51 Acres.
1862	Fallow and Potatoes	Beans, Tares, and Oats	Mangolds and Swedes	Oats and Tares	Fallow, Tares, and Grass.	Oats
1863	Wheat and Swedes	Wheat and Oats	Barley and Oats	Fallow and Clover	Wheat and Grass	Fallow
1864	Barley and Tares	Fallow	Clover and Swedes	Wheat and Oats	Barley and Potatoes	Wheat and Oats
1865	Barley, Beans, and Fallow	Wheat and Swedes	Wheat and Fallow	Beans and Oats	Beans and Swedes	Clover and Fallow
1866	Wheat and Barley	Barley	Barley, Oats, and Tares	Wheat	Wheat and Oats	Wheat
1867	Barley, Beans, and Mangolds	Fallow and Peas	Barley and Beans	Ditto	Oats and Fallow	Fallow
1868	Barley, Wheat, and Beans	Wheat	Wheat	Oats and Swedes	Barley and Beans	Wheat
1869	Wheat, Oats, and Beans	Sainfoin & Lucerne	Barley and Oats	Wheat	Wheat	Oats
1870	Wheat and Barley	Ditto	Beans	Ditto	Barley	Beans and Barley
1871	Barley	Ditto	Wheat	Oats and Beans	Wheat	Wheat
1872	Wheat	Wheat and Oats	Clover	Wheat	Ditto	Ditto
1873	Ditto	Ditto	Wheat	Oats	Ditto	Ditto
1874	Ditto	Wheat	Ditto	Wheat	Clover	Ditto
1875	Oats	Ditto	Ditto	Barley	Wheat	Clover
1876	Ditto	Clover	Ditto	Ditto	Ditto	Wheat
1877	Ditto	Wheat	Ditto	Clover	Ditto	Ditto
1878	Clover	Barley	Ditto	Wheat	Ditto	Barley
1879	Wheat	Ditto	Ditto	Ditto	Barley	Ditto
1880	Ditto	Ditto	Ditto	Ditto	Ditto	Oats

DETAILS OF MANAGEMENT.

The *modus operandi* of my husbandry is very simple. Directly after harvest, the steam-plough of John Fowler and Co.—a powerful, untiring, and economical machine, which is my mainstay—turns over furrows six or seven inches in depth, ploughing nine acres per day. This is not a modern double-engine set, but one of the earlier pieces of apparatus supplied from the Leeds Works, being a 14 horse-power engine, fitted with a clip drum, and working with a self-travelling disc-anchor, the four-furrow plough and the balance cultivator being constructed with the automatic differential gear for holding taut the tail-rope. This tackle, set to work in 1862, has served me well, and after tilling more than 10,000 acres exhibits no signs of being unable to continue executing the heavy field-work, and has cost during nineteen years so moderate an expenditure for repairs and renewals that I calculate 10 per cent. upon the first cost as ample for both wear and tear and depreciation fund.

Occasionally a piece of stubble is broken up by the steam scarifier or cultivator, and autumn-cleaned before being ploughed; for, in a wet summer, beds of couch will be formed in some fields, and must be extirpated. Clover ley is lightly ploughed for wheat. Harrowing and drilling are performed by horses, and the aim is to get the wheat in as early as possible with the land in a good condition. As a preparation for barley, a stubble ploughed soon after harvest is sometimes worked over a few weeks later with the four-furrow plough from which the second and fourth mould-boards are removed, leaving all four shares and the coulters on. The effect is to thoroughly cut the whole of the ground, and leave it in ridge-like form, exposing a large amount of surface to the atmosphere. Land treated in this way only requires harrowing in spring at the time of barley-sowing.

I may here mention that in some localities there is a dislike to land being worked by steam.

This arises from the abuse of the power. At the desire of the farmer, fields are sometimes ploughed at first to too great a depth, and matter brought up which takes time to be incorporated into the surface soil.

After draining, it is necessary to loosen the land by the aid of the subsoil plough, and then plough yearly not more than 6 to 8 inches deep. Mistakes are frequently made by cultivating and cross-cultivating, whereas when corn crops follow each other it is much better to use the plough only. It is needless to say that steam is a grand power, enabling the farmer to do his work at the right time rapidly, economically, and well.

Horse-labour in spring is employed in sowing barley and oats, in harrowing wheats, and horse-hoeing wheats and barleys.

Hand-hoeing and weeding are well-done. The principal summer work is cutting, making, and carting the clover and sainfoin hay, which is stacked in the fields where it grows. Visitors coming after all the spring corn has been put in look upon mine as wonderfully easy farming. For I am spared all the heavy and protracted labours of ploughing, cross-ploughing, cultivating, dragging, harrowing, rolling, cleaning, couch-burning, ridging, sowing, horse-hoeing, hand-hoeing, singling, &c., connected with roots and other fallow crops; excepting, indeed, the small area of mangold and other green crops, grown in one field, and manured from the stables. In fact, between spring-seeding and hay-time there is no field-work going on besides the hoeing, sowing grass-seeds, and top-dressing the growing crops.

At harvest I find reaping-machines for the customers, who buy the crops at the yearly auction, and I let out the horses for working the machines or for carting the corn to field-ricks.

The corn crops are staked out in lots, ranging from five to fifteen acres in extent, shortly before reaping time, and are sold by auction as they stand, at per acre, the plots being measured by a surveyor when the crops have been cut. The sainfoin, clover, or lucerne hay is sold in the ricks.

Except when lots are bought in at the sale and not afterwards disposed of, I am obliged to purchase all my seed-corn, and this is probably to the benefit of the yields, particularly when I select samples of good varieties from localities giving a distinct change of soil and sometimes also of climate.

APPLICATION OF MANURES.

The manures for corn are partly drilled in with the seed and partly applied as top-dressing in the spring. Guano, superphosphate, and bones are drilled with the seed; but the large drill (by W. and C. Woolnough) is so constructed that the manure, passing down a separate tube in advance of the seed-depositing tube, is placed at least half an inch lower in the ground than the seed. I drill with cereals three to five cwt. per acre of manure as named above, excepting for wheat after clover ley, which on my farm does not require artificials. When wheats in spring appear to want feeding with manure, a light application of guano or nitrate of soda is given by hand in March or April. Barley and oats are drilled with 1¼ cwt. of guano, and a mixture of bones and superphosphate; and after a few weeks' growth these crops are also top-dressed, if necessary, with nitrate at the rate of 1¼ cwt. per acre.

Clover and other crops for hay have broadcasted upon them in spring 1½ cwt. per acre of guano or nitrate of soda. Frequently the dose is divided and applied twice, at intervals of a fortnight or three weeks, according to the weather and the condition of the crops.

The outlay for manures since I began the system has been as follows:—

Cost of Artificial Manures for Nineteen Years.

Year.	Amount. £	s.	d.
October 1861 to November 1865 ..	640	0	0
1866	434	9	11
1867	529	5	3
1868	1473	6	9
1869	1282	3	5
1870	1551	16	11
1871	1254	16	5
1872	1022	7	6
1873	1353	0	10
1874	950	15	6
1875	878	7	6
1876	1173	16	8
1877	974	5	10
1878	1175	6	9
1879	1502	0	0
1880	860	0	0
Average for 15 years, 1866–80	1137	0	0
„ for 6 years, 1868–73	1323	0	0
„ for last 7 years, 1874–80 ..	1073	0	0

Let it be noticed that the heaviest outlay for manures has not been in later years. While the expenditure under this head has averaged 1137*l.* per annum for the whole period of fifteen years, since I was able to commence cleanly management, the average for six years of this period, namely 1868–73, was 1323*l.* a year; but for the last seven years the average is 1073*l.* a year. The inference is that the productiveness of the soil has not required heavier dressings in order to continue its bearing of bulky crops, allowance being duly made for inclemency of seasons. On the contrary, I have had, notably in

1879, examples of wheat-plant overdone by too plentifully manuring it. A thin and backward plant may sometimes deceive the judgment, and be taken as indicating deficiency of nutriment in the soil, and hence it was that I was led in one or two instances to administer to the young crop liberal diet, which was afterwards found not to have been wanted.

In general, my artificial manure bill amounts to about 50*s.* per acre over the whole farm. A word of explanation is required respecting the apparent irregularity of expenditure for the last two years. In 1879 I bought 72 tons of bones (bone meal), 25 tons of Purser's mineral superphosphate, 35 tons of Ohlendorff's dissolved Peruvian guano, 6 tons of raw guano, 22 tons of nitrate of soda, and 2 tons of kainit; 162 tons altogether, at a total cost of 1502*l.* In 1880 I bought 40 tons of Cook's bone meal, 15 tons of raw guano, 20 tons of dissolved Peruvian guano, 7½ tons of nitrate of soda, and 10 tons of mineral superphosphate; 92½ tons altogether, at a total cost of 860*l.* But to reckon the yearly expense aright, these two years must be taken together, inasmuch as many tons of bones, superphosphate, guano, and nitrate were left over from 1879 and used in 1880. The average of 1879 and 1880 was 1181*l.* per annum. This is very close to an average of 50*s.* per acre over the whole area cultivated, namely 436 acres, deducting from the total of 450 acres 14 acres for roads, ditches, hedges, &c.

THE CHEMISTRY AND PERMANENCY OF THE SYSTEM.

In my successful practice I have followed the sound advice of Dr. Voelcker as to the kinds and quantities of artificial manure best adapted for my purpose—advice founded upon chemical analysis of the soils of the farm. It is only by attention to these principles adapted to suit the conditions of each particular case, that such a system of agriculture can be successfully prosecuted.

Dr. Voelcker has kindly furnished me with the following Report on the rationale of my system of cultivation and its permanency.

"The system of growing wheat after wheat, or wheat and barley, on the same fields for a number of years in succession, practised with remarkable success by Mr. Prout of Sawbridgeworth, is not suitable for light soils or land naturally poor in the mineral elements of fertility, but only for clay soils and strong loams, abounding in all the mineral food-constituents which enter into the composition of corn crops.

"But little plant-food can be got out of light, sandy soils, and hence the productiveness of such soils can only be maintained by the supply of the elements of fertility from without, in the shape of farmyard manure and suitable artificial manures, such as Peruvian guano, bone-dust, superphosphate, nitrate of soda, and other artificial manures; or by the liberal consumption of corn or linseed and other feeding cakes, in conjunction with roots and other green crops, and the hay and part of the straw raised on the farm—a plan necessitating the adoption of a suitable rotation of crops. Occasionally, when light land has been much enriched by dung or the consumption of cake on the land, it may be advisable to grow a crop of barley after wheat; but, as a rule, it is not profitable to grow on such soils two white crops in succession.

"Unless means are adopted of regularly restoring the elements of fertility which are removed from the land by the corn crops, light soils—however productive they may have been rendered temporarily by the application of dung and suitable artificial manures, or by high farming—in the course of very few years return to their naturally infertile condition. A striking contrast to light soils, as regards their supply of plant-food, is presented by many clay soils and strong deep loams, which contain within an accessible depth abundant stores of mineral food to supply the wants of a large succession of wheat and other corn crops. The difficulty with such soils is to render the inert mineral food available for the use of corn crops.

"Clay soils frequently are unproductive, not on account of a deficiency of phosphoric acid, potash, and other mineral plant-foods, but in consequence of imperfect drainage, insufficient aëration and inefficient cultivation, and the bad physical condition of the land. The aim of the occupier of such land should be to develop the locked-up dead capital of the land, constituting the abundant and, in some instances, almost inexhaustible stores of mineral plant-food. How this can be achieved the author of this publication has shown in the preceding pages. The question which naturally suggests itself to others inclined to follow Mr. Prout's system of continuous growth of corn is: Can the fertility of the land be permanently maintained by such an exhaustive course of cropping, or is it likely in the long run to be seriously injured thereby? In other words, does Mr. Prout's system lead to the gradual but sure exhaustion or deterioration of his land, or is it likely to keep up or to increase its productiveness for any number of years?

"Before attempting to examine and, if possible, to answer this important question, it is well to remind the reader that Mr. Prout does not entirely depend for success upon the natural resources of his land, inasmuch as he spends on an average about 2*l.* 10*s.* per acre per annum in the purchase of well-selected artificial manures; and thus his plan of cultivation differs materially from the late Mr. Smith's (of Lois Weedon), who entirely depended upon the natural sources of plant-food present in the soil and the atmosphere, for growing wheat after wheat for a number of years on the same fields.

"The soil on Mr. Prout's farm varies a good deal in character in the different fields. Most of the fields were originally strong loams and moderately stiff clays; by steam-cultivation in the autumn, and the thorough working of the land since it passed into Mr. Prout's hands, the soil has been mellowed down and greatly improved in its physical character. Some of the fields are lighter than others, but, on the whole, all may be described as more or less strong land, resting upon a subsoil of drift clay and cretaceous gravel or chalk-marl.

"In the year 1865 I submitted to chemical analysis samples of soil from three fields, which appeared to me fairly to represent the more striking variations in the character of the soils on Blount's and Sweet Dew's farms; and twelve years afterwards (that is, in October 1877) I again took samples from the same fields, a succession of corn crops having been grown in the interval. The analyses which I made in 1865 were less minute than those I made in 1877. The results of the two sets of analyses not being strictly comparable, the earlier chemical results need not be quoted in detail; suffice it to say, that the later analyses of 1877 show no exhaustion of the soil in Broadfield, Blackacre, and White Moor, three fields from which I took the samples.

"The following tabular statements show the composition of the three soils.

Composition of Three Soils at Blount's Farm, October 1877.

	(1) Broadfield.	(2) Blackacre.	(3) White Moor.	
* Organic matter and water of combination	5·033	6·344	4·200	Soluble in hydrochloric acid.
Oxide of iron	5·200	5·312	3·659	
Alumina	3·400	4·560	4·100	
Lime	1·360	3·312	·670	
Magnesia	·400	·432	·266	
Potash	·365	·468	·320	
Soda	·121	·179	·031	
Phosphoric acid	·141	·204	·141	
Carbonic acid	·875	1·640	·380	
Sulphuric acid	·060	·109	·061	
Nitric acid	·001	·001	·001	
Chlorine	·005	·011	·002	
†Insoluble silicates and sand ..	83·066	77·401	86·233	
	100·027	99·973	100·066	
†Consisting of :—				Insoluble in hydrochloric acid.
Oxide of iron	1·827	1·625	·763	
Alumina	6·188	4·489	6·607	
Lime	·511	·774	·638	
Magnesia	·388	·332	·167	
Potash	·424	·518	·182	
Soda	·920	·534	·304	
Silica	72·848	69·273	77·626	
	83·106	77·545	86·287	
* Organic matter—				
Containing nitrogen	·170	·107	·141	
Equal to ammonia	·206	·129	·171	

"A glance at these analytical data shows that the soils of each of the three fields contain from one-tenth to nearly two-tenths per cent. of nitrogen, and all the mineral constituents which enter into the composition of the ashes of our corn crops.

"The Blackacre field is richest in lime, phosphoric acid, and available potash, and the White Moor field contains least lime and available potash, and as much phosphoric acid as the soil in Broadfield.

"In a chemical point of view the White Moor soil is the least fertile, and Blackacre the richest of the three soils. All three, as we shall see presently, contain abundant stores of mineral plant-food, in a readily available form. In addition to the soil-constituents soluble in moderately strong hydrochloric acid, the three soils further contain insoluble silicates, from which in the course of time considerable quantities of potash, soda, lime, magnesia, and soluble silica are liberated by atmospheric agencies.

"The Blackacre soil, it will be seen, contains most potash, in the form of silicate of potash, and the White Moor soil the least potash in this state. The constant removal of the most important organic and inorganic soil-constituents, such as nitrogen, phosphoric acid, and potash, by corn crops sold off the farm, results, as is well known, in the more or less rapid deterioration and gradual exhaustion of the land, if no means are taken to restore to the soil in some way or other these important elements of plant-food.

"To persons who are imperfectly acquainted with Mr. Prout's system of farming, it may appear that the continuous growth of wheat after wheat or of barley after wheat for a succession of years is likely to lead to the ultimate exhaustion of the land, and that, however successful Mr. Prout may have been in past years, the time will come, perhaps sooner than he expects, when the land at Blount's farm will cease to grow remunerative crops of wheat or barley. So novel a system of farming can hardly be expected to meet with the approval of men who are rather disposed to pursue the beaten track of agricultural routine than to take up any new mode of cultivation. Reasonable doubts, it cannot be denied, may well be entertained whether corn can be grown economically in this country from year to year in the same fields without permanent injury to the corn-yielding powers of the land. The question whether or not Mr. Prout's land is likely to be exhausted in the course of time, and for how many years his system is likely to continue a practical success, is worthy of a careful examination, for which the preceding soil-analyses furnish useful and reliable data.

"Numerous weighings of soils similar to those on Blount's farm have shown me that a piece of soil 1 foot square and 6 inches deep weighs from 60 to

63 lbs. in its natural moist condition, or about 50 lbs. in a perfectly dry state.

"Calculated per acre, the absolute weight of 6 inches of a clay soil in a moist state varies from 2,613,600 lbs. to 2,746,280 lbs., or in a perfectly dry state to about 2,480,500 lbs. No great error, therefore, will be made if we assume that 6 inches of moist clay soil in a dry state weigh 2½ millions of lbs. per acre, or 1116 tons.

"For the sake of simplifying subsequent calculations, I assume the weight of 6 inches of soil to be only 1000 tons instead of 1116 tons per acre.

"According to the preceding analyses, 6 inches of soil from Broadfield, Blackacre, and White Moor contain per acre:—

	Broadfield.	Blackacre.	White Moor.
In a readily available form:—	tons.	tons.	tons.
Lime	13·6	33·12	6·72
Magnesia	4·0	4·32	2·66
Potash	3·65	4·68	3·20
Soda	1·21	1·79	·31
Phosphoric acid	1·41	2·04	1·41
Sulphuric acid	·60	1·09	·61
Nitric acid	·01	·01	·01
Chlorine	·05	·11	·02
In the shape of insoluble silicates:			
Lime	5·11	7·74	6·38
Magnesia	3·88	3·32	1·67
Potash	4·24	5·18	1·82
Nitrogen in the shape of nitrogenous organic matter	3808 lbs.	2397 lbs.	3158 lbs.

"Or, confining our attention to the more important soil-constituents, the three fields contain per acre in a depth of only 6 inches, and in a readily available form:—

	Broadfield.	Blackacre.	White Moor.
	lbs.	lbs.	lbs.
Phosphoric acid ..	3,158	4,569	3,158
Potash	8,176	10,483	7,168
Lime	30,464	74,188	15,052
Magnesia	8,960	9,676	5,947
Sulphuric acid.. ..	1,344	4,569	1,366
Nitric acid	22	22	22
Nitrogen	3,808	2,397	3,158

"The percentage of phosphoric acid in the three soils varied from ·141 to ·204, which is a very small proportion of the whole soil. However, when calculated to the acre, the actual quantity of phosphoric acid in 6 inches of soil from Broadfield and White Moor weighed nearly 1½ tons, and in 6 inches of soil from Blackacre more than 2 tons.

"The preceding calculations clearly show the enormous quantities of phosphoric acid, potash, lime, and other mineral matters, and also the large quantities of nitrogen, in an acre of soil only 6 inches deep. If it be borne in mind that the roots of wheat generally penetrate the soil to a depth of at least 2 and frequently to 3 feet or more, and the preceding figures are multiplied by 4 or 6, we obtain an insight into the enormously large amount of mineral and nitrogenous plant-food which is presented to the wheat crop in an acre 2 or 3 feet deep.

"Let us now examine how far the natural resources of these three soils are capable of supplying the requisite amount of plant-food to ensure a good crop of wheat or barley.

"The grain and straw of wheat contain in round numbers in 100 parts:—

	Grain of Wheat.	Straw.
Water	15·0	16·0
*Nitrogenous substances	11·1	4·0
Non-nitrogenous matters	72·2	74·9
Mineral matters (ash)	1·7	5·1
	100·0	100·0
*Containing nitrogen	1·78	·63

"The ash of wheat contains in 100 parts:—

	Grain of Wheat.	Straw.
Phosphoric acid	50·0	5·0
Sulphuric acid	·5	2·7
Silica	2·5	67·0
Lime	3·6	5·5
Magnesia	11·5	2·0
Potash	30·0	13·0
Chloride of sodium, oxide of iron, sand, &c.	2·0	4·8
	100·0	100·0

"A good crop of wheat, amounting to 40 bushels per acre at 60 lbs. per bushel, weighs 2400 lbs. Such a crop will produce about 2 tons of straw per acre.

40 bushels of the grain of wheat or 2400 lbs.	contain	42¾ lbs. of nitrogen.
2 tons of wheat straw	„	28¼ lbs. „ „

"In such a crop of wheat sold off the farm, 71 lbs. of nitrogen are removed.

"The total weight of mineral matter extracted from the land by 40 bushels of wheat and 2 tons of straw amounts to 255 lbs., of which 31 lbs. occur in the grain, and 224 lbs. in the straw.

"Amongst the mineral constituents in a crop of 40 bushels of wheat and 2 tons of straw we find:—

	In the Grain.	In the Straw.	Total.
	lbs.	lbs.	lbs.
Phosphoric acid	15·5	11·2	26·7
Lime	1·	12·5	13·5
Magnesia	3·5	4·5	8·
Potash	9·5	29	38·5
Sulphuric acid	¼	6	6¼
Silica	¾	150	150¾

"Nearly two-thirds of the total amount of mineral matters in the grain and straw of an acre of wheat consist of silica, of which there is an ample supply in almost every soil. The restoration of silica, therefore, need not trouble us in any way, especially as there is not a single instance on record proving that silica, even in a soluble form, has ever been applied to the land with the slightest advantage to wheat or other corn crops.

"According to the given data, I find, 6 inches of soil from Broadfield contain as much phosphoric acid as 118 good crops of wheat of 40 bushels and 2 tons of straw, as much potash as 212 crops, and as much sulphuric acid as 215 crops of wheat; and that 2256 crops of wheat contain no more lime, or 1120 crops no more magnesia than is found in 6 inches of this soil.

"In the case of Blackacre, I find in 6 inches of soil per acre as much

Phosphoric acid	as in	171	crops	of wheat
Potash	„	272	„	„
Lime	„	5476	„	„
Magnesia ..	„	391	„	„

and in 6 inches of White Moor soil as much

Phosphoric acid	as in	118	crops	of wheat
Potash	„	186	„	„
Lime	„	1115	„	„
Magnesia ..	„	743	„	„
Sulphuric acid	„	218	„	„

The amount of nitrogen per acre in 6 inches of soil in Broadfield is as great as that in				51	wheat	crops
In Blackacre	„	„	„	34	„	„
And in White Moor	„	„		44	„	„

"The following is the average composition of barley :—

	Corn.	Straw.
Water	17·0	13·0
*Nitrogenous compounds	9·9	4·4
Non-nitrogenous organic substances ..	70·9	77·6
Mineral matter (ash)	2·2	5·0
	100·0	100·0
*Containing nitrogen	1·58	·7

"The ash of barley on an average contains in 100 parts

	Corn.	Straw.
Phosphoric acid	33·0	3·8
Sulphuric acid	1·0	3·5
Silica	28·0	60·0
Lime	2·5	8·7
Magnesia	8·0	2·5
Potash	24·0	15·0
Chloride of sodium, oxide of iron, sand, &c.	3·5	6·5
	100·0	100·0

"A barley crop of 40 imperial bushels per acre, weighing 52 lbs. per bushel, with straw weighing about one-fourth more than the grain, contains:—

Nitrogen .. In corn, 32·86 lbs. In straw, 18·20 lbs.

or in both together 51 lbs. of nitrogen in round numbers, and the following mineral matters:—

	In Corn.	In Straw.	Total.
	lbs.	lbs.	lbs.
Phosphoric acid	15	5	20
Potash	11	19½	30½
Lime	1	11	12
Magnesia	3½	3¼	6¾
Sulphuric acid..	½	4½	5
Silica	13	78	91

The nitrogen in an acre of soil 6 inches deep in Broadfield is equal to the nitrogen in	74	barley crops
In Blackacre " " " "	47	" "
And in White Moor " " "	62	" "

"As regards the more important mineral substances, 6 inches of soil in Broadfield contain per acre

As much phosphoric acid as	158	barley crops
" potash "	268	" "
" lime "	2538	" "
" magnesia "	1327	" "
" sulphuric acid "	269	" "

"An acre of soil 6 inches deep in the Blackacre field contains

Phosphoric acid equal to that in	228	crops of barley
Potash " "	344	" "
Lime " "	6182	" "
Magnesia " "	1433	" "
Sulphuric acid " "	488	" "

and 6 inches of soil in White Moor field per acre:

Phosphoric acid	**equal**	**to that in**	**158**	**barley**	**crops**
Potash	,,	,,	235	,,	,,
Lime	,,	,,	1254	,,	,,
Magnesia	,,	,,	881	,,	,,
Sulphuric acid	,,	,,	273	,,	,,

"These calculations afford clear evidence of the enormous quantities of plant-food in only 6 inches of an acre of clay land. Two or three feet of such land, practically speaking, contain almost unlimited stores of mineral plant-food. It is clearly undesirable to leave all this mineral wealth unutilised, as so much dead capital. Our aim should rather be to draw upon the natural resources of the land; to supply in the most efficacious form some only of the constituents which occur in it in comparatively small proportions, and by thoroughly working the land to convert crude and inexpensive mineral soil-constituents into more valuable vegetable productions, supplying food to man and beast. An attentive perusal of the preceding figures will show that nitrogen—the most important and most expensive element of fertility—occurs in Mr. Prout's soils and most other clay soils in smaller proportions than any of the mineral elements of fertility. Moreover, the greater part of the nitrogen in the nitrogenous organic matters of the soil does not exist in a condition immediately available for the use of corn crops. This clearly points to the propriety of supplying wheat, barley, or oats with ammoniacal or readily available nitrogenous manures, or to top-dress corn crops with nitrate of soda, sulphate of ammonia, soot, and other manures containing nitrogen in a soluble and readily available condition.

"Of all the mineral soil-constituents, phosphoric acid is the most important, for the simple reason that it occurs in most soils in comparatively small proportions, and is required by corn crops in larger quantities than lime or magnesia, and other minerals which occur in most soils in almost unlimited quantities, or which, if deficient, can be easily and cheaply incorporated with the land.

"Potash, another valuable mineral plant-food, occurs in Mr. Prout's land in sufficient quantities to supply a large number of wheat crops with this essential ash constituent of wheat and barley. However, it is well to bear in mind that the stores of available potash in the course of time may be exhausted to some extent by the continuous growth of corn crops, if no provision is made to add to the land potash in some form or other.

"In Mr. Prout's case this contingency does not appear to have occurred in the course of the sixteen years during which he has grown corn from year to year in the same fields, for trials with potash have given negative results, and proved that potash is not wanted, and probably may not be required to be used as a manure for many years to come. Lime also has been tried on some of the fields on a small scale, but with no beneficial results. I have already pointed out that Mr. Prout spends on an average annually 50*s.* per acre in the purchase of artificial manures, and, as he followed my advice as regards the application of artificial manures, it devolves upon me to examine the question whether or not his system of cultivation in connection with the supply of manures is rational, and likely to maintain the land permanently in a state of desirable fertility, and to ensure good corn crops in fair average seasons.

"Bone-meal, mineral superphosphate, raw Peruvian guano, and Ohlendorff's dissolved guano, and nitrate of soda, are the manures generally used; with the exception of nitrate of soda, which is applied as a top-dressing, the artificials are generally drilled in, and not sown broadcast.

"The mineral superphosphate is bought of a guaranteed strength of 26 per cent. of soluble phosphate at a cost of 4*l.* per ton delivered.

"The bone-meal used in 1880, bought at 7*l.* 10*s.* per ton, had the following composition:—

COMPOSITION OF BONE-MEAL.

Moisture	7·85
* Organic matter	34·25
Phosphate of lime	46·41
Carbonate of lime, magnesia, and alkaline salts	7·74
Insoluble siliceous matter	3·75
	100·00
* Containing nitrogen	3·79
Equal to ammonia	4·60

"Formerly a mixture of equal parts of bone-meal and mineral superphosphate was applied for wheat in autumn, at the rate of about 5 cwt. per acre. A top-dressing of 1½ cwt. of Peruvian guano is applied early in February if the season permits, and again 1 cwt. of nitrate of soda in May, if the crop seems to require it.

"The bone-superphosphate is made on the premises, in accordance with my advice, by saturating bone-dust or bone-meal with water, and then mixing it in equal proportions with mineral superphosphate containing 26 per cent. of soluble and 3 to 4 per cent. insoluble phosphates, and about 36 per cent. of sulphate of lime. The acid phosphate acting upon the wetted bone-dust, partially dissolves the latter, and causes the mixture to heat. By leaving it undisturbed in a heap for two months or more, it is rendered sufficiently dry, on turning over, to be readily distributed by the drill. By this means the bone-dust, acted upon by the acid phosphate, is softened and rendered more immediately available for the crops.

"Of late the proportion of bone in the mixture has been increased, and 2 parts are now used to 1 part of superphosphate.

"For barley the same mixture, about 5 cwt. per acre and 1 cwt. of Peruvian guano added, is employed. The mixed artificial manure is drilled in at the same time as the seed, but passes through different coulters, so that the manure is deposited a little deeper than the seed, and the tender rootlets, directly they push forth in search of food, may find it readily and the plant receive a vigorous start.

"Later in the season the barley is top-dressed either with 1 cwt. of nitrate of soda or with Peruvian guano, if the crop requires it.

"The following is the composition of the artificial manures, composed of 3 parts by weight of bone-meal, 1 of mineral superphosphate, and 1 of Peruvian guano.

Moisture	16·25
* Organic matter and salts of ammonia	28·65
Monobasic phosphate of lime	2·49
Equal to tribasic phosphate of lime (bone-phosphate) rendered soluble by acid	(3·91)
Insoluble bone-phosphates	37·52
Sulphate of lime, magnesia, and alkaline salts ..	11·35
Insoluble siliceous matter	3·74
	100·00
* Containing nitrogen	3·71
Equal to ammonia	4·51

Cost of this manure:

3 cwt. of bone-meal	£1	2	6
1 cwt. of superphosphate	0	4	0
1 cwt. of Peruvian guano	0	11	0
5 cwt. per acre, costing	£1	17	6

"5 cwt. of this manure contain 20¾ lbs. of nitrogen, and 1 cwt. of nitrate of soda 17½ lbs.

"Thus in these manures 38¼ lbs. of nitrogen in a readily available and efficacious form are applied to the acre. A crop of wheat of 40 bushels at 60 lbs. per bushel and 2 tons of straw we have seen contains 71 lbs. of nitrogen. If, therefore, 5 cwt. of bone-manure and 1 cwt. of nitrate of soda are applied to the wheat, 32¾ lbs. of nitrogen have to be supplied by the atmosphere, and by the nitrogenous organic matters in the soil.

“A crop of 40 bushels of barley weighing 52 lbs. per bushel, and 2600 lbs. of straw per acre, contains 51 lbs. of nitrogen.

“By manuring the barley with 5 cwt. of bone-manure and 1 cwt. of nitrate of soda, 38¼ lbs. of nitrogen will be furnished by the manures, and only 12¾ lbs. will have to be supplied by the atmosphere and the organic matters in the soil.

“With regard to the mineral requirements of wheat and barley, attention has been already directed to the fact, that with the exception of phosphoric acid, Mr. Prout's land contains such abundance of lime, magnesia, potash, and other mineral matters which enter into the composition of the ashes of wheat and barley, that we need not trouble ourselves about returning these more common soil constituents to the land. It only remains therefore for us to inquire whether the amount of phosphoric acid in the manures used by Mr. Prout for wheat or barley is sufficient to restore to the land adequately this important mineral plant-food.

“We have seen that in a good crop of wheat

26¾ lbs. of phosphoric acid are removed in the corn and the straw. In a barley crop of 40 bushels per acre 20 lbs. of phosphoric acid are drawn from the soil, and removed in the corn and straw sold off the farm.

"The quantity of phosphoric acid in 5 cwt. of the bone-manure, the composition of which has been given above, I find amounts to 106 lbs. in round numbers, and as a crop of 40 bushels of wheat removes only 26¾ lbs. of phosphoric acid from the land, and a similar crop of barley only 20 lbs., Mr. Prout, it will be seen, returns to the land four times as much phosphoric acid as the wheat crop removes from it, or five times as much as is taken off by a good crop of barley.

"So far from impoverishing the land in the most valuable of all mineral constituents, my impression has long been that Mr. Prout actually enriches his land in this respect. It may indeed be questioned whether Mr. Prout is not too liberal in the supply of bone-manures. A considerable reduction in the quantities of bone-manure usually applied to wheat or barley might do no harm, and effect a saving in the manure bills.

"This much seems certain, that deep and thorough tillage and aëration of the soil and subsoil appears to be preparing from year to year abundance of all the more common mineral constituents of plant-food, and that the quantities of bone-manures and guano which Mr. Prout applies to the land are more than sufficient to guard against the gradual exhaustion of the most valuable of all mineral fertilising matters.

"No fear whatever need be entertained that under this system of cultivation and manuring, the land will be impoverished, for after the twelve or fourteen years during which I have watched Mr. Prout's farming operations I can perceive no indications of incipient exhaustion, but on the contrary clear evidence of the great improvement which has been effected in once unproductive clay land; nor can I recognise any theoretical grounds for doubting that the wonderful improvement which Mr. Prout has achieved in his land at Sawbridgeworth will be less a success in years to come than it has been in the past.

"I can see no reason why, with this system of manuring and an occasional dead summer fallow in order to give a thorough cleaning to the land, Mr. Prout should not be able to grow wheat or barley profitably for an indefinite number of years without injury to his land."

TENANT'S OUTLAY AND RETURN.

As it would be tedious to go through the smaller items of every year's debit and credit account, I think it sufficient to state the Average Annual Expenses, making an abstract from my books for two comparative periods, namely for nine years ending with 1874, thus commencing after the period during which the extra cost was incurred of the initial improvements, for which the charge is spread over a lengthened term of years, and again for four years ending with 1878.

The items which are not actual payments and must be allowed for consist of depreciation in the value of the steam plough tackle, the horses, implements, and harness; the rent, interest on the landlord's improvements, and a sum for recouping the tenant's outlay in improvements. As to the first, I have already said that I consider repairs, renewals, insurance, and depreciation to be covered by an allowance of 10 per cent. upon the first cost of the steam engine and its tilling apparatus. For the replacement of the horses, harness, and implements, I allow the same rate of 10 per cent. upon the prime cost.

Had I been tenant instead of proprietor I should probably have paid through most part of my term the old rent of 25*s.* per acre, with an addition after the first four years of 10*s.* per acre, which would be 5 per cent. upon the owner's investment of 4500*l.* in improvements; the two amounting to about 35*s.* per acre. In the year 1875 a professional valuation placed the rental value at 45*s.*, and another judgment by a practical agriculturist and agent was that the farm at that time was fairly worth 40*s.* per acre to occupy. To charge this full rent against myself, the improving occupier, whose enterprise and outlay have been the main instrumentality in creating this additional value, would be grossly unjust; though to the shame of the English system of land tenure, as carried out on too many properties, I know that improving farmers are liable to be fined in this way by being put up to the competition rent instead of being righteously allowed a fair share of the enhanced value they have given to an estate. In my view, the rent is properly taken in my account at 3½ per cent. on the 16,000*l.* purchase-money, legal expenses, &c. For while landed property has been commonly declared to yield only 2½ per cent., I am looking at my agricultural experiment from a commercial point of view, and putting forward inducements to owners to consent to the improvement of their estates. My opinion is that all agricultural land in this country ought to pay 3½ per cent. on the purchase-money, and that it would do so if the laws and usages under which it is held and transferred were simplified, and land tenancy with its customs and obligations were placed on a purely commercial basis. On the landlord's 4500*l.* of permanent improvements capitalised I have allowed the handsome interest of 5 per cent., although in so doing I am lessening the share of profit which would otherwise be shown as accruing to the tenant. The 3½ per cent. on 16,000*l.* and the 5 per cent. on 4500*l.* together amount to a rent of about 35*s.* per acre.

To recoup the further 2700*l.* of tenant's permanent improvements, it is necessary either that the tenant shall be repaid that amount in cash, and thenceforth hold at the full competition rent, or that he shall continue the occupation at such an abatement from full rent as will amount to the 2700*l.* in a prolonged term, say of twenty years. Interest at 5 per cent. upon the tenant's 2700*l.* sunk in improvements comes to 6*s.* per acre on the 450 acres; and in the financial statement I suppose the tenant to continue at the rent of 35*s.* instead of paying 41*s.* per acre, which may be the full or true value.

The annual outlay will therefore stand as follows :—

Tenant's Average Yearly Outlay.

		£
Rent, 3½ per cent. on 16,000*l.* purchase-money, legal expenses, &c.	£560	
Interest, 5 per cent., on 4500*l.* of landlord's improvements	225	
	——	785
Tithe Rentcharge, Rates, Taxes, Insurance		220
Manures		1081
Seed corn		172
Clover, sainfoin, rye-grass, mangold, and turnip seeds		25
Manual labour		509
Bailiff's salary		100
Keep of six farm horses at 30*l.*		180
Coal, oil, &c.		50
Depreciation, repairs, &c., on steam ploughing engine and tackle, 10 per cent. on 1065*l.*		106
Depreciation on six farm horses, 10 per cent. on 240*l.*		24
Depreciation on implements, harness, &c., 10 per cent. on 680*l.*		68
Average for 13 years, 1866–78		3320
„ for 9 years, 1866–74		3359
„ for last 4 years, 1875–78		3235

The auction sales furnish the returns of the produce sold in the thirteen years from 1866–78. To these are added the proceeds from about twenty acres near the homestead, which are manured from the stables, and also receive, as required, doses of artificials. The hay, swedes, mangolds, tares, wheat, and oats from this 20 acres is valued at 200*l.* in each year.

Yearly Returns.

	£
1866	3530
1867	2623
1868	4926
1869	3942
1870	5432
1871	4826
1872	4944
1873	4770
1874	4828
1875	4748
1876	4668
1877	4650
1878	4726
Average of 13 years, 1866–78	4509
„ of 9 years, 1866–74	4424
„ of last 4 years, 1875–78	4698

The total annual production of the farm for thirteen years ending 1878 has thus averaged 4509*l.*; an increase appears in the average of 4424*l.* for the nine years, 1866–74; it amounts to 4698*l.* a year for the last four years, 1875–78. This is equivalent to 10*l.* 8*s.* 9*d.* per acre on the whole farm.

The profit account stands as follows:—

Average Yearly Returns and Profits.

	Average of 13 Years, 1866–78.	Average of 9 Years, 1866–74.	Average of Last 4 Years, 1875–78.
	£	£	£
Returns	4509	4424	4698
Less auction expenses, including auctioneer's commission	200	200	200
Nett returns	4309	4224	4498
Deduct outlay	3320	3359	3235
Nett profit per annum	989	865	1263

My seventeen years' experience down to 1878 brought these annual tenant's profits: for the first four years, *nil*; for the next nine, 865*l.*; and for the last four years, 1263*l.* a year, or 56*s.* per acre on the whole farm.

What do these profits amount to upon the tenant's capital? The capital engaged differs from that requisite on a stock farm where continual marketing of animals and products enables the occupier to meet many of the outgoings as they arise. In my case, with the exception of some cuttings of artificial grass and part of the hay, I sell nothing during the entire twelvemonth in which the crops are being produced. Nearly everything raised upon the farm has been disposed of at the annual sale in August, and the customers have been allowed nine months' credit after paying a deposit on the purchases. Seeing that a considerable proportion of the outlay is in cash transactions, and that, had I been a tenant, I should have enjoyed not more than three months' grace in the payment of the rent, I should require as tenant a capital representing about 1200*l.* beyond the yearly working expenses and the sum sunk in improvements. It would stand thus:—

Average Tenant's Capital.

		£
Fixed Capital—		
Tenant's improvements	£2700	
Steam plough	1065	
Implements, harness, &c.	680	
Six horses at 40*l*.	240	
	——	4685
Working Capital—		
Average yearly outlay, 13 years	3320	
Less depreciation account	198	
	——	3122
Cash in hand, say		1200
		——
Total capital		9007

On 450 acres this is a capital of 20*l*. per acre.

In thirteen years, 1866–78, my nett profits total up 12,857*l*., averaging 989*l*. a year, which is very nearly 11 per cent. upon my whole tenant's capital of 9000*l*. The rate of yearly profit for the nine years, 1866–74, averaged 865*l*., or 9⅔ per cent.; and for the last four years, 1875–78, it has averaged 1263*l*., or 14 per cent., upon the same 9000*l*. capital.

With regard to the four opening years of the occupancy, 1862–65, they showed an aggregate loss of 689*l*.

I leave it to an actuary to calculate what deduction from the annual profits should be made in perpetuity to reimburse this initial loss; but supposing the whole 689*l*. to be recouped during the thirteen remunerative years, 1866–78, it would reduce the average yearly profit from 989*l*. to

936*l.*, or less if I were to reckon for interest and compound interest.

The two years 1879 and 1880 demand some observations. The crops of the last year have not yet all been marketed, and the year before was about the most disastrous for strong-land farmers of any in the present century. It would have been a miracle if any corn-growing had flourished despite summer rains without precedent, and a calamitous absence of the indispensable sun. Looking fairly at the result of the year, in the crops and the prices realised, I debit 1879 with a loss of at least 500*l.* I may here quote what a writer in *The Times* reported of my crops as they stood in that late and luckless harvest, on August 27th. He said:—

"From inspection of the now nearly matured crops (not merely viewing them from the roads, but penetrating into the middle of the spacious fields), I discover no sign of diminution in produce as compared with previous years. The 'Home Field,' 60 acres in extent, carries the greatest crop of wheat I have seen anywhere this year; a portion of it, Browick red, another portion square-headed or white-chaff red, all standing well, though very thick and bulky, the strong straw bearing heavy heads. To a slight extent the ears show the defects common to the crops of the present year, and the grains are not sufficiently numerous in the ranks to warrant expectation of a great yield. Were this an ordinary season, I should estimate the produce at fully six quarters per acre; practical farmers from Kent, who were viewing the piece at the same time as myself, put it at five quarters and a half. Other wheats look exceedingly well, with the exception of a part of one field, in which many barren or defective heads appear. The oat crops are heavy, and must yield abundantly; and the barleys, which occupy a larger area than the wheats, are certainly good, although not to be described as very heavy; it is only in a few places that they are somewhat thin and short; they are ripening kindly, and promise to be of fair malting quality. I am inclined to value the barleys all round at five quarters per acre. As a whole, the crops are fully equal to those of last year. Considering that Mr. Prout, like other farmers, was prevented from using the horse-hoe, and accomplished hand-hoeing and weeding with great difficulty and partial success, it is remarkable that sowthistles, wild-oats, daisy-weed, and grass show themselves in so few places—a result of many years' practice of clean farming. The sainfoin gave a heavy first cut of well-got hay, which is now in stack."

On September 2nd I offered the crops at the fourteenth sale (the twelfth in uninterrupted succession); but of the 370 acres of corn, only 131 found purchasers, the remainder being bought in. Though the crops were good, the prices made were in most cases low. Wheat, extending to 38 acres, averaged 9*l.* 17*s.* per acre; 79 acres of barley, 6*l.* 2*s.* per acre; 14 acres of oats, 4*l.* 18*s.* 6*d.* per acre; the general average on the 131 acres sold being 7*l.* per acre. The whole 79 acres of barley were bought by a corn-merchant in the neighbourhood, who thrashed out an average of 4 quarters 3 bushels per acre, and sold some at 46*s.* and the rest at 42*s.* per quarter, making a net profit of 150*l.* This is proof that the barley was a good crop, though, from the prevailing depression, the auction sale was bad.

In 1880, deeming that neither farmers nor merchants were in good heart for speculating in standing corn crops, I held no sale, and did my own harvesting. On August 23rd Mr. Finlay Dun thus reported in the *Chamber of Agriculture Journal*:—

"Nothwithstanding the limited opportunity for keeping down rubbish, the farm is cleaner than most in the neighbourhood, or, indeed, most elsewhere. Black grass and wild oats are the chief weeds; there is very little twitch, and not any docks or thistles. Nothwithstanding the scourging corn cultivation, the crops are anything but feeble, knee-broken, or otherwise indicative of exhaustion. I went over Mr. Prout's farm this week. His 436 acres are in a very satisfactory state. His crops are uniformly good. He has 158 acres of wheat, in about equal proportions of square-head (a useful, strong-strawed, white-chaffed red wheat), and of Rivett's bearded wheat. The square-head is now being reaped, the Irish and other labourers receiving 13*s.* per acre for cutting, tying, and setting up. It varies from 4 to 4½ quarters per acre; not much of it is laid; some patches occasionally, as is common this year, are lighter-coloured and prematurely ripened, probably the result of the loosening of the root by the late stormy weather. Ears are here and there found not very fully filled, the imperfection doubtless depending on untoward weather having prematurely brushed off the blossom. This deficiency, however, is not so common as it is in most midland districts. The wheat in 'Blackacre,' which last year was poor and blighted, thanks to the more propitious season rather than to any difference in management, now exhibits a good, close, kindly crop, partly of Rivett's, likely to cast five quarters, and partly of square-head, promising four quarters. Such results testify that last year's failure depended on the untoward season, and not on any exhaustion of the soil or anything connected with Mr. Prout's special system. Barley reaches 132 acres, and, as elsewhere, will probably pay better than wheat. The successful working of the land in spring, and the luxuriance of the crop, helped wherever needful by top-dressing, has kept down weeds; and upwards of five quarters will be averaged. The dripping season has suited the black Tartarian oats, which are a beautiful crop, strong, thick, and well corned, extending to 86 acres, some of the best pieces promising a yield of eight quarters. Sixteen acres were in tares, partly used green, the remainder yielding about two tons an acre of hay, which will be used for the horses, cut into chaff, and given with a portion of the four acres of mangolds which were drilled round the portion of the sainfoin field where the plant had failed. Giant sainfoin in its second year in the worst field of the farm has done remarkably well: machine-cut, and luckily well made, about eighty horse-loads were, five weeks ago, cleared off forty acres, and put into two ricks for which 350*l.* had been bid. Forced along by the summer rains, a second cutting has since been well saved, and must be worth 150*l.* Considering that the sainfoin has had no manure this year, 12*l.* an acre must be regarded as a very satisfactory return, which may be repeated next year, especially as it is determined to give a spring top-dressing to the value of 40*s.* an acre."

I have thrashed and sold the barley crop which is off "White Moor," a field of 66 acres. The yield was 5 quarters 6 bushels per acre, and the sum realised, without the straw, 648*l.*, or 9*l.* 16*s.* per acre. It was a decidedly barley year with us, and the whole of the barley has turned out an average of 5½ quarters per acre. The wheat, on the contrary, did not ripen kindly for want of sun in July, and, consequently, when the hot weather came in August it went off too quickly, and is somewhat shrivelled. However, the average of the red and Rivett wheats together comes to 3 quarters 3 bushels per acre. The oats are 7 quarters per acre.

Thus, the nineteenth year, while not my best because of the very moderate season, is not an unfavourable member of the series; its produce was not forced by extra doses of manure, and betrays no falling off in the long-taxed fertility of the soil. I know nothing to prevent my continuing corn-cropping in perpetuity under the same rate of manurial dressing and the same complete and perfect mechanical tillage.

CROPS AND PRICES.

I have heard objectors, unable to dispute the fact of my success, condemn the system upon general grounds, one being that the flooding of our markets with cheap imports of grain and flour and the enhanced cost of labour forbid English farmers to look for profit in corn-growing, and clearly destinate the wheat-lands of this country to green-crop cultivation or to grass. Now, it may be true enough that strong lands can no longer yield a remunerative return for corn culture under common modes of husbandry; but what has that to do with my proposition that it will still answer to grow corn upon such lands by a new system altogether? Examine the facts of the experiment conducted on an adequate scale upon a farm of 450 acres. If I have realised a yearly profit during the later years of the term, and in times when the price of corn has ruled low, and, further, if I am doing this while other heavy-land farmers cannot show balance-sheets which are satisfactory, it is demonstrated that the system is worth following, no matter what policy may be best for those who persist, either from choice or compulsion, in managing upon the old methods.

The actual prices made at market by customers who bought the standing crops I am not able to tell, but it will be sufficient for me to compare each year's profit with the Imperial average prices of grain in order to prove that my corn-growing is by no means contingent upon a run of high markets, and unremunerative when quotations are such as appear likely to continue for the future. I have taken the Imperial averages for the three months July, August, and September, about the time of the sales. The working expenses being tolerably uniform, excepting in that larger item, the cost of manures, and in the item for manual labour, I do not trouble the reader with minor fluctuations from year to year, but in the following table deduct from the actual proceeds of each year the average outlay, corrected according to the labour-bill and the excess or reduction in each year's expenditure for manures. The returns consist of the amount realised for produce, less auction expenses, with 200*l.* added in each year for the proceeds off 20 acres.

This Table shows that the yearly profit of 1142*l.* for eleven years, 1868–78, has accrued under a general Imperial average for July, August, and September, of 54*s.* 2*d.* for wheat, 36*s.* 8*d.* for barley, and 27*s.* 5*d.* for oats. Prices were higher for the first seven years of the series, but the profit was less, namely 1074*l.* per year. And for the last four years prices were lower, but the profit

Profits and Prices for Eleven Years.

Year.	Return in Produce sold.	Total Outlay.	Nett Profit.	Imperial Average Prices per Quarter in three months, July, August, and September.		
				Wheat.	Barley.	Oats.
	£	£	£	s. d.	s. d.	s. d.
1868	4726	3713	1013	59 1	40 9	29 5
1869	3742	3564	178	50 11	33 9	26 7
1870	5232	3816	1416	50 4	33 9	25 3
1871	4626	3463	1163	57 9	35 2	26 4
1872	4744	3409	1335	58 11	33 10	24 2
1873	4570	3636	934	61 4	39 2	28 4
1874	4628	3149	1479	55 5	42 10	29 10
1875	4548	3043	1505	49 0	34 11	29 8
1876	4468	3378	1090	47 1	34 4	28 5
1877	4450	3163	1287	62 0	36 10	27 7
1878	4526	3358	1168	44 6	38 2	25 11
Average of 11 years.	4569	3426	1142	54 2	36 8	27 5
Ditto of first 7 years.	4609	3535	1074	56 3	37 0	27 1
Ditto of last 4 years.	4498	3235	1262	50 7	36 0	27 10

was greater, namely 1262*l.* per year. The truth is that yield and expenditure have a greater influence upon profit than the price of corn has. In the years 1875, 1876, and 1878, when wheat, according to the Imperial averages at the time of the sales, stood at only 44*s.* 6*d.* up to 49*s.* per quarter, the profits ranged from 1090*l.* up to 1505*l.* per annum; and, in fact, the highest profit of all was realised in 1875, when the Imperial average price was 49*s.*, not anywhere near the highest in the scale. I am not afraid of future averages, even as poor as the prices of 1879, when the Imperial average for the whole year for wheat was 43*s.* 10*d.*, for barley 34*s.*, and for oats 21*s.* 9*d.*

For that may be taken as representing a reduction of about one-ninth in the value of my wheat; and supposing straw to remain at present value, perhaps the receipts for wheat would be diminished by about a twelfth instead of a ninth part (the reduction in grain only). But the prices of barley and of oats have scarcely fallen at all; and if I were to grow as much of these two grains as of wheat, my total receipts would not be diminished even a twelfth. With yields no better than in the last four years in the table, and expenditure remaining the same, the result might be a lowering of the annual return by perhaps a twentieth part, leaving the net yearly profit still as much as 1039*l.* upon 450 acres of heavy land.

I commend this inference to those who imagine that my corn-growing is doomed to cease in the prospective period of low prices now believed to have come upon us.

Now as to the character of the crops up to the seventeenth year of the experiment. The average sum realised per acre for the white straw crops, grain and straw as they stood unharvested, is given in the following synopsis, not including beans and peas, grown only in the earlier years, or the hay and forage from clover, sainfoin, rye-grass, tares, and lucern. The prices were made at the public auction sales, and I have omitted the years 1865 and 1867, in which the produce was harvested and disposed of by private contract.

Average Price per Acre for Crops (including Straw) Unharvested.

Year.	Wheat.			Barley.			Oats.			On all Corn Crops.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1864	9	2	11	7	10	8	6	15	9	8	8	0
1866	9	18	11	5	19	11	5	3	9	8	3	5
1868	14	14	2	13	2	10	10	0	0	12	0	2
1869	14	6	8	12	9	2	8	0	8	10	12	6
1870	15	3	10	10	9	3		..		12	6	6
1871	14	3	2	8	17	6		..		10	19	3
1872	11	0	5		..		7	12	2	10	16	0
1873	10	8	11		..		7	16	5	9	18	4
1874	10	17	7		..		9	15	0	10	13	3
1875	10	12	7	9	1	8	11	3	9	10	3	0
1876	10	1	5	7	7	10	8	5	7	8	0	0
1877	11	14	10	8	16	10	8	12	4	10	0	0
1878	10	2	7	9	15	0	8	12	6	9	15	3
Average of 13 years.	11	14	5	9	7	0	8	7	1	10	2	9
Ditto of first 9 years.	12	4	0	9	14	0	7	17	8	10	8	7
Ditto of last 4 years.	10	12	10	8	15	4	9	3	6	9	9	7

During the last four years of the series my wheats realised on an average 10*l.* 12*s.* 10*d.* per acre, instead of 12*l.* 4*s.* per acre obtained during the previous nine years, being a falling-off of $12\frac{3}{4}$ per cent. But the value of the crops in the judgment of my customers would have been only about 6 per cent. less had prices remained the same. The Imperial average for wheat had however fallen from 54*s.* 2*d.* to 50*s.* 7*d.* for the two corresponding periods, or made a drop of 7 per cent. My barleys in the later period made an average of 8*l.* 15*s.* 4*d.* per acre, instead of 9*l.* 14*s.* obtained in the first nine years, being a falling-off of 9⅔ per cent.—all due to inferiority in the crops, because the Imperial average prices had remained the same, namely 36*s.* 8*d.* for the first nine years, and 36*s.* for the last four. But my oats rose in value from 7*l.* 17*s.* 8*d.*, the average per acre for the earlier period, to 9*l.* 3*s.* 6*d.*, the average per acre for the later period, this being an improvement of 16⅓ per cent., and no part of this was due to increase of price, the Imperial average being unaltered, comparing the two periods together.

The joint effect is, that my total receipts for these corn crops for the last four years averaged 19*s.* per acre less than during the former nine years—a falling-off of 9 per cent. My returns would have cut a worse figure had I not of late years increased my proportion of barley and taken a smaller acreage of wheat, while keeping up a large breadth of oats.

As further evidence of the maintaining power of the tilling and manuring upon the description of land which I farm, there is the enduring productiveness of particular fields under a protracted succession of white-straw crops, all wholly removed, both grain and straw.

Series of Crops on "Home Field," 60 *Acres.*

Year.	Crop.	Sum realised per Acre for Corn and Straw, all sold off.	Imperial Average Prices per Quarter for July, August, and September.
		£ s.	s. d.
1870	Wheat	14 14	50 4
1871	Barley	9 3	35 2
1872	Wheat	7 2	58 11
1873	Ditto	10 7	61 4
1874	Ditto	9 16	55 5
1875	Oats	10 15	29 8
1876	Ditto	8 6	28 5
1877	Ditto	8 0	27 7
1878	Clover (twice Hay)	14 5	..
1879	Wheat (unmanured)	10 8	47 2
1880	Wheat	10 3	42 10
Average return for Corn Crops in 10 years	..	9 17	(wheat) 52 8
Ditto for Wheat, first 5 years	..	10 9	(wheat) 55 3
Ditto for Wheat, last 2 years	..	10 5	(wheat) 45 0

Succession of Crops on "White Moor," 66 *Acres.*

Year.	Crop.	Sum realised per Acre for Corn and Straw, all sold off.	Imperial Average Prices per Quarter for July, August, and September.
		£ s. d.	s. d.
1871	Barley	8 7 6	35 2
1872	Wheat	8 8 0	58 11
1873	Ditto	8 10 0	61 4
1874	Oats	10 2 6	29 10
1875	Barley	8 15 0	34 11
1876	Ditto	8 2 0	34 4
1877	Ditto	8 6 0	36 10
1878	Ditto	8 8 0	38 2
1879	Ditto	..	31 4
1880	Ditto	11 1 0	31 3

Succession of Crops on "Dudley," 40 *Acres.*

Year.	Crop.	Sum realised per Acre for Corn and Straw, all sold off.			Imperial Average Prices per Quarter for July, August, and September.	
		£	s.	d.	s.	d.
1871	Wheat	15	7	0	57	9
1872	Clover	12	3	6	..	
1873	Wheat	12	15	0	61	4
1874	Ditto	10	8	0	55	5
1875	Ditto	10	17	6	49	0
1876	Ditto	10	7	6	47	1
1877	Ditto	14	4	0	62	0
1878	Ditto	10	10	0	44	6
1879	Ditto		..		47	2
1880	Ditto (20 acres)	9	10	0	42	10

Succession of Crops on "Brook Field," 16 *Acres.*

Year.	Crop.	Sum realised per Acre for Corn and Straw, all sold off.		Imperial Average Prices per Quarter for July, August, and September.	
		£	s.	s.	d.
1873	Wheat	9	14	61	4
1874	Ditto	9	9	55	5
1875	Barley	8	17	34	11
1876	Ditto	8	13	34	4
1877	Ditto	8	6	36	10
1878	Wheat	8	12	44	6
1879	Barley	7	3	31	4
1880	Ditto	..		31	3

IS THE SYSTEM GENERALLY APPLICABLE TO HEAVY-LAND HUSBANDRY?

Nineteen years' experience at Sawbridgeworth proclaims that my continuous corn-growing and sale of the whole of the produce is not, as some might have supposed, deteriorating my estate.

The crops show no decadence; they are double the bulk and the value they were when I bought the farm or during the first four years of the experiment. The land is very much cleaner and more easily worked. Both practical experience and chemistry confirm the expectation that, with thorough cultivation and restorative applications of properly selected manures, I may go on taking corn in perpetuity without damaging the inherent fertility of the soil. In these days, when most descriptions of farming pay badly, I can moreover claim that my improved results have been secured economically. My farming on the whole has been remunerative.

The same simple, attainable, not very costly means might reproduce similar profitable results in almost every county of England. Thousands of acres of strong land, at present a source of discomfiture and loss to owner and occupier, worth less than 20*s.* an acre of annual rent, much of it neglected, foul and deteriorating, some of it lying uncropped for several years, nevertheless contain, as Dr. Voelcker has shown mine to do, in more or less available form, ample supplies of plant-food from which might be manufactured more than a hundred crops of wheat and a still longer series of other corn crops. While we are importing nearly one-half of our bread-stuffs and one-fourth of our animal food, and complaining of our languishing agriculture, should these valuable available stores lie neglected?

Their working does not involve any speculation or absorb any vast amount of capital. Draining, thorough cultivation, and manuring are the three chief means by which these bountifully provided treasures of the soil are rendered available, extracted, and converted into valuable food for man and beast.

Within twelve months the labours of the field bring their results. My land for wheat is ploughed and prepared immediately after harvest, that for barley or oats is again moved in early spring. Steam securing the more prompt and effectual performance of the work, as already shown, is preferred to horse power. These simple processes ensure the salutary aëration of the soil, increase the solubility of these stores of plant-food, and maintain a favourable friable mechanical condition so essential for the healthy growth of corn crops especially on heavy land. Weeds are destroyed by horse and hand hoeing. When they accumulate and are likely to interfere with successful cropping, they are got rid of by fallowing, which may be requisite at intervals of eight or ten years. Clover and sainfoin usefully vary the cropping. Regular and profitable growth of all plants is ensured by feeding them in their earlier life by soluble manures placed at their roots, and subsequently by top-dressings.

By these plain and easily followed methods for nineteen years my crops have been successfully raised.

Mine have been doubled, why should not my neighbours also double theirs? The Earl of Leicester, Lord Vernon, Lord Derby, and many others have stated that much of the land of England by better management might produce 50 to 100 per cent. more than it now does.

The best lands have generally been well and liberally managed, and in the main are contributing their fair quota of varied produce. From the second qualities of land, and notably from the heavier clays, a largely augmented produce can however be still extracted. By draining and breaking up wet indifferent old pasture, I have found that with good cultivation the production has increased 50 to 150 per cent. Throughout the whole farm I have earned, as has been shown, an augmented return of at least 100 per cent. The breaking up of second-rate grass land is often profitable. The laying down of clay land, except in favourable localities, sometimes proves disappointing and costly. Such land, instead of being laid down, is often more profitably kept under tillage. In the North of England and in Scotland abundant illustrations occur of heavy land successfully devoted to arable culture, of cattle and sheep being profitably reared and fed, of fair returns being obtained for outlay. It is unwise without careful consideration to espouse the popular cry and lay down too much arable land to grass. Expenses will sometimes thereby be diminished, but profits will also generally be considerably reduced.

My system of corn-growing and disposing of the crops has been objected to on the plea that the land is thereby wastefully exhausted. This objection is effectually controverted by Dr. Voelcker's report. Portable manures to the value of 40*s*. or 50*s*. applied annually are shown fully to maintain fertility and counterbalance the amount of straw removed. The sale of straw in many parts of the country is justifiable in an economic point of view.

With cheap portable manures and feeding-stuffs, which fittingly replace produce sold, it is absurd to adhere, as many landowners and agents still do, to antiquated restrictions as to cropping and sale of produce. Would any sensible owner of a market garden limit the amount of crops, the mode of their succession, or the portions to be sold? Would he not readily realise that the more stuff that could be profitably raised and sold, the better would it be both for landlord and tenant? And the better also must it be for labourers and the community at large. The same principle equally applies to ordinary farming. When it is enterprisingly carried out, with judiciously applied capital, better returns result to all concerned. Reverting to the sale of straw: worth about 10*s.* per ton to convert into manure, it must be unwise to prevent a tenant selling when he can get for it three times that amount. Of course, the growth of straw for sale cannot be very materially extended without considerably lowering the price. But in the intelligent feeding and comfortable littering of live stock, straw carefully used is worth 30*s.* to 40*s.* per ton, and with the increasing prices of cattle and sheep, the means of raising and feeding them must proportionally advance in value. My system is not Procrustean. It is capable of indefinite adaptation. The sales of the fodder and straw which have hitherto been pursued would not be continued if it were found more profitable to consume these products with cattle or sheep on the farm.

Nay, more; land clean and in good condition as mine is, if desirable could in part be devoted to roots, and with a few extra buildings might prove as profitable if employed for mixed farming and carrying stock as it has hitherto done whilst growing and selling corn crops.

But whatever the produce and howsoever that may be disposed of, the essential principles of management would still remain unchanged. No farming can prosper unless the land is dry, the arable portions clean and thoroughly cultivated, and kept in condition by the judicious liberal use of manure. Systematic attention to these principles has rendered my farming a success, and doubled within twenty years the value of my estate.

Why should not the same system secure like benefits for thousands of tenants and hundreds of landlords?

IMPEDIMENTS IN THE WAY.

There exist in England isolated cases in which enterprising agriculturists are proceeding somewhat according to my system. But in what other branch of industry would it have been possible for success equal to mine to be left during nineteen years with so few imitators? Had I been as successful an improver in almost any other line of business I should, years ago, have found my profitable practice introduced far and wide with modifications adapting it to any number of special circumstances, and myself, perhaps, defending a patent against parties seeking to deprive me of the benefit and credit of the method. Why is it that, for aught I can perceive, I may go on for another nineteen years without leading hundreds and thousands of farms to a similar pitch of improvement? For these things have not been done in a corner. Publicity has been fully given to every season's experience; thousands of agriculturists have inspected my operations; chemists have analysed the soil, and lectured on the results; and ample tribute of praise has been paid to the experiment for the scale on which it is being conducted. The answer to the question is plain enough to my mind. Unless I am prepared to libel the qualities of Englishmen, and to malign the intelligence and spirit of my brother farmers, I am obliged to assert that it is the ill condition of land tenancy in its laws and customs in this country which stands so obstinately in the way of at least one proved mode of reaping profit from the clay soils of whose future many people now despair.

I ask, Where are the properties on which the system can be at once introduced? A few landowners may be deemed to possess both the means for embarking in a thorough remodelling of farms for the purpose, and the practical ability to conduct steam-farming themselves; and a small number of tenant farmers may be found who are able to purchase the land they would improve. Mainly, however, the work remains to be done, if at all, by men occupying land at a rental. The non-adoption of the system is evidence to me that the bulk of the estates upon which it would bring profit in place of loss are in the hands of owners whose legal position or temporary interest in their property forbid their either making the necessary permanent improvements themselves or permitting such improvements to be made by other parties. Their land is under entail or settlement, and if they are allowed to sell portions of their property provided they re-invest in mortgages or other fixed estate, they may not part with one acre in order with the sum so realised to double the value of three acres. They cannot admit any improvement by a tenant which would introduce a fresh claim upon the revenues of the estate until a number of conflicting interests are satisfied or protected; and it would be folly or actual self-devotion for them to invest money or incur liability for prospective gains which neither they nor theirs may ever realise. The subject is complicated, even for a legal mind; and I add no more on this head, than that I have little hope of the redemption of heavy lands from their unremunerative condition unless existing fetters and disabilities, and (what is more potent) the lack of inducement to improve, are removed from the ownership of land.

As a tenant, entering upon such an undertaking as mine, I should deem it a necessity to be allowed full scope and liberty of action in the treatment of the farm. Not only should I have absolute freedom as to kinds and succession of cropping, and as to the selling of any kind and quantity of produce; but I could not have stirred a step in my career of success at Sawbridgeworth if I had been hampered by estate rules, written consent to works proposed, restrictions as to fences or watercourses, lopping of timber, understanding about game, and so on. It would have done me no harm had I been bound to deliver up the farm at the end of the term, or after due notice, in a cleanly condition, so far as compatible with difficult seasons. But no such improvement as I have prosecuted would have been practicable, had I not enjoyed the fullest power to grub fences, stock up scrub timber, and completely remodel the farm surface, its inclosures, ditches, and roadways.

My transactions with manure dealers and manufacturers, with seedsmen, growers of seed-corn, tradesmen, and others, being double in aggregate amount what I should pay to the landlord, I see no reason why I, as tenant, should be placed at a disadvantage in my dealing with these parties by the preferential right of distress now given by law to the landlord. If a large amount of capital per acre is to be attracted to the improved cultivation of land, it must be encouraged, if not favoured, and certainly it must not be subjected to any discouragement. And I look upon it as very important that there should be speedily enacted by Parliament an equalisation of legal protection to the landlord, the banker, the merchant, the tradesman, and any other of the farmer's creditors.

Other relations of landlord and tenant also demand consideration. The landlord should pay all tithes and half the rates—this latter arrangement would probably ensure more supervision and economy in expenditure.

With regard to duration of tenure, the very nature of the enterprise implies a lengthened term of occupancy without increase of rent. But not necessarily by a lease, binding both parties to a bargain which might become burdensome and inequitable by the occurrence of changes in market values of produce, or in the value of land, not contemplated at the opening of a nineteen or twenty-one years period. I should be content to enter upon the work of improvement under agreement for a single year, subject thereafter to twelve months' notice (equivalent to two years certain) provided that ample compensation were secured to me in case of a non-renewal of the contract, such security operating as an effectual bar to early determination of the tenancy by will of the landlord. Whether held by lease or agreement, the tenant should also be bound to compensate the landlord for any deterioration of the property.

Feeling strongly on this subject of compensation, I shall speak plainly. I am convinced that the greatest impediment to the extension of my husbandry over the heavy lands of the kingdom, lies in the fact that no law yet provides any safeguard that a tenant shall obtain the full fruits of his enterprise. Should I have embarked my capital in heavy outlay for many consecutive years as I have done if all I had in prospect in the event of quitting had consisted in payment for unexhausted improvements, that is for the unrecovered portion of my expenditure, *as commonly understood?* Could I have made the venture, and persevered through years of loss to years of reimbursement, if I had not been sure of receiving a fair share of the value which my money and culture created on the estate? Supposing that I, as tenant, quit in five years from this date, this is what I have to take under the Agricultural Holdings Act of 1875. And here I am supposing that the tenant executed all the permanent improvements, and, according to that Act, only with the consent in writing of the proprietor. The drainage, having been the work of 1862–65, is held to be valueless after twenty years; it is assumed that my outlay of 2700*l.* has been gradually recouped to me in produce, besides the yearly interest on the sunk investment. I am not to be repaid a sixpence of this money, and the drains, in as good working order as ever, together with the vastly ameliorated condition of the soil due to their action through this course of years, accrue to the owner without his having contributed a shilling of the new value thus conferred upon the estate. Of my 1800*l.* expended in outfalls, wells, reservoirs, roads, clearing, reclaiming, and fencing, including 750*l.* laid out upon buildings, I am to be repaid nothing. They are assumed to be of no value to the future occupier or possessor; and I am supposed to have been recouped by twenty years' enjoyment of them for the sum they cost me. But no matter whether they have served my purpose or not, or whether I have derived satisfactory aid from these works in tending to the remunerative character of my business, is it equitable and honest that these works, with all the advantages they give to the estate, should be handed over for nothing to the proprietor, who expended nothing in their creation —nay, that I am to be repaid none of this money which, among other benefits, added 18½ acres to the cultivable area of the farm?

So far as its "First-class" improvements are concerned, the Agricultural Holdings Act is wholly inadequate to satisfy my just claims as an improving tenant. Of the six specified works, classed in the Act as "Second-class" improvements, durable though not permanent, and deemed to become exhausted in seven years at the *maximum*, none were executed on my farm. And as for "Third-class" improvements, the law gives me nothing; my 1081*l.* worth of artificial manures applied during the last year of the term being deemed to be exhausted by my having taken from the land so manured "a crop of corn, potatoes, hay, or seed, or any other exhausting crop."

Hence, my position as tenant is this, at the end of the term of twenty-four years I quit without any compensation. But what ought I to receive? It is true that good profit upon my capital has accrued to me in a majority of years; but over and above that, I claim to be entitled to something for my 7200*l.* sunk in improvements (supposing the tenant to have done all and the landlord nothing), and for the result of those improvements and of my long practice of thorough tillage and clean management, namely an estate worth many thousands of pounds more than it would have been worth without them. I am not greedy in my expectations. I do not ask for the whole value which my husbandry has added to the farm. The owner may fairly claim a portion, for he ran some risk in entrusting his property in the native fertility of soil and subsoil to an occupier who might or might not succeed in doing well to it. Besides, it is most desirable that proprietors should have before them a powerful inducement to let their lands to men of capital and enterprise, prepared to meet foreign competition by augmented home-production. Yet I refuse to admit the justice of the tenant (remunerative though his business may have been) yielding up the entire additional value he has created in the farm for the owner to appropriate as an "unearned increment." If this additional value was of only small amount, I, as tenant, want an equitable share; and if my share would be a fortune for me, over and beyond what I may have accumulated out of the yearly profits, I ought equally to have it. And the hope of so participating in the fruits of the undertaking is requisite for the attraction of capital and enterprise to the work.

I have set forth what is my position, as tenant, quitting under the Agricultural Holdings Act. I leave with nothing. What is the position of the landlord under the same Act? His farm was worth 16,000*l.* when I entered upon it; he has annually received a rent of 560*l.*, which is 3½ per cent. upon his purchase-money (including cost of exchanges and legal charges), and, having paid me nothing whatever, he comes into possession of this farm now worth 31,000, or 15,000*l.* more than he gave for it; and he lets it henceforward at an increase of rent of 3½ per cent. upon that, or 1085*l.* a year—nearly doubling his income, not out of his own but out of my investment of capital and labour as tenant. I am willing to part with as much as one-third of this added value; but my demand is for not less than two-thirds for myself. And until an adequate principle of compensation is established by statute, placing occupiers in a sound and advantageous position, or rather, saving them from an unfair and discouraging position, I see little prospect of a general extension of profitable corn-growing, or any other system of intensive husbandry requiring a prolonged period of working with abundant capital.

As to the mode in which the tenant's share of the improved value should be secured to him, it is not imperative for the landowner to find a lump sum of money to meet the obligation. The tenant or his heirs might continue to hold the farm for a considerable period without increase of the original rent, or on quitting he might be empowered to exercise one of the three Irish "F's," and dispose of his interest in the holding to his successor.

Reference has been made to a valuation of the farm. In February 1875, the late Mr. Thomas C. Scott professionally valued it, and in his report said: "Taking into consideration the intrinsic value of the land and its present condition, I estimate the gross rental value of the farm at 55*s.* per acre, equal to 1245*l.* Deducting therefrom the average tithe rent-charges, amounting respectively, the rectorial to 100*l.* per annum and the vicarial to 20*l.*, together 120*l.*, and the poor-rates at 80*l.*, making 200*l.* per annum payable by the tenant, leaves a nett rental of 1045*l.* per annum. In capitalising this rental, the land-tax amounting to 16*l.* 16*s.*, and the sewers rate, 3*l.* 3*s.*, have to be deducted, leaving a nett income of, say, 1025*l.* for the landlord." This amounts to 45*s.* per acre. Mr. Scott placed the value of the fee-simple at 31,000*l.*, or about 69*l.* per acre. Reporting on the farm in the same year in the 'Journal of the Royal Agricultural Society,' Mr. Finlay Dun wrote: "Considering the quality of the land, as well as the capital sunk in its purchase and improvement, 900*l.* a year, or 40*s.* per acre, may be taken as a reasonable rent." While confirming this estimate of the increased value of the farm, he says, "instead of the 33*l.* per acre originally paid for it, the estate would now bring double that amount."

Any fall in the general value of landed property since that date in an unwelcome manner dims the splendour of such a result; but, as I have already reminded my readers, those persons who begin now, and probably henceforward, with a permanently lowered price of land, will have before them less fear of such a reduction. And it should be remembered that the proportional gain from my husbandry will not depend upon increase of the actual money value of the land. For in case of a progressive decrease in the general value of land, my husbandry would attain the same proportional result, by minimising the fall in the value of my particular farm as compared with others, or by preserving its market value from being lowered while that of other lands fell. The benefit is the same, whether the system of culture succeeds in adding 20*l.* per acre to the fee-simple while the general value of estates remains unaltered, or maintains the fee-simple at the original figure while the general value of estates has been reduced 20*l.* per acre.

CONCLUSION.

The experience of nearly a quarter of a century at Sawbridgeworth justifies my drawing the following practical conclusions.

The heavier second-rate clay soils of England are not, as has lately been hastily concluded, incapable of profitable cultivation. By judicious outlay and rational management I have shown that they may be raised from a profitless to a profitable condition, and economically maintained in that condition. More corn, and perhaps meat, may be got from them than heretofore. Increased production must be more determinedly aimed at by farmers of all descriptions.

That this increased production may be more widely accomplished will necessitate considerable changes in the system of land tenure. The antiquated obstructions which interfere with the outlay alike of owner's and occupier's capital must be removed.

Heavily mortgaged, embarrassed landlords, who have no resources to develop or maintain their estates, through encumbered estates courts or other means should have facilities for the disposal of the whole or portions of their heritage which has become profitless to themselves, to their tenantry, to the labourers, and to the community. Without draining, buildings, and somewhat costly permanent equipments, still inadequate in many localities, the bare unimproved earth is unfit to yield its profitable increase. Impecunious nominal life owners, hampered and harassed, have seldom money to spend upon their estates; they are often unable to retain or encourage the good tenants who in bad times should be helped, or to check, improve, or remove the idle, incompetent, or careless who are ruining themselves and deteriorating their holdings.

The landlord in many instances has not the means to put his farms into a condition fitted for the successful prosecution of modern agriculture. He cannot or will not make the liberal arrangements which might induce the better class of tenants to give substantial assistance in the work of improvement. Antiquated ideas as to rights and privileges, prejudice, and want of knowledge are the too frequent impediments which bar the arrangements which should stimulate the tenant to expend the fructifying capital.

As has been pointed out in these pages, uncertainties and difficulties of law and custom at present hold the hand of the cautious tenant, who under more encouraging circumstances might enterprisingly improve his occupation. The improvements do not belong to the improver, and hence if made at all are made grudgingly, imperfectly, or in a temporary or perfunctory manner.

Agriculturists, perhaps reasonably, are blamed for want of commercial enterprise; they nevertheless have sufficient commercial knowledge and practical experience to render them chary of laying out money unless assured of fair returns. They are willing enough to take the risks of seasons, but they demur to lose, as many have done, both crops and improvements.

Until assured of some considerable share in any enhanced value conferred on their holding by their own labour and capital, such useful expenditure will be withheld, or bestowed very grudgingly. The recognition and payment by the landowner of tenant's outlay, approved as it is by many wise landlords, should be secured to all tenants by statute.

Without some such measures for attracting more capital to the better cultivation of the soil, agricultural depression will be little abated, farms will be difficult to let even at greatly reduced rents, half crops will continue to be reaped on thousands of acres, many pastures will remain inadequately stocked, tenant's profits will still be meagre, emigration will be the distressed agriculturist's main resource, labourers, as now in various localities, will be half employed, still bigger supplies of bread stuffs and meat will be needed, and British agriculture will undergo no very permanent improvement.

In taking leave of my readers, I will add again that I know of no other means but increased production which can enable agriculturists to surmount their present unparalleled difficulties.

I would that landlords and tenants treated land culture as really a matter of partnership, and that, for self-preservation, the owners put forth every effort to save the existing tenantry. The reflection is continually forced upon me that, if many proprietors who are to be found in most counties knew practically the trials, losses, and disappointments to which the cultivators of their farms are subjected they would extend greater sympathy to men in times of difficulty, and encourage tenants in good times to earn by superior management a fund against days of misfortune. One of the very best ways of rendering assistance to good tenants is to contribute towards their farming supplies of the most suitable manures or feeding stuffs. Our eminent chemists can point out what are the best kinds of manure for the several soils, and, from fertilisers bought with a guarantee, and the bulk after delivery sampled for analysis, both the occupier and the owner will derive the most sound and substantial benefit.

With the setting free of land ownership and land occupancy, and the attraction of ample capital into husbandry, there need be little fear that

English farming will remain for any considerable period unprofitable.

One thing is certain, that the land of the United Kingdom, with our increasing population, can never go out of cultivation.

It was for the very purpose of demonstrating by a practical example what may be done to restore or sustain the position of English agriculture upon one widespread class of soils in this kingdom, that I began the important experiment now described. And this I did with the view of inducing owners to allow occupiers to practice the system of husbandry which I should prove to be capable of serving or enriching them. My object was to throw a light to which no man could be blind upon the one obstacle in the way of agricultural progress, namely, the lack of an adequate tenant right made certain and effectual by statute.

I leave it to my readers to pronounce whether I have not shown by my own example the road to remunerative farming upon heavy lands, and the urgency for a prompt measure of land tenure reform, which alone can provide inducement for capital and enterprise to walk in it.

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